



Focus for Teacher Assessment of Primary Science (Focus4TAPS)

Further Appendices

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Appendix D: Additional analyses and robustness checks

Primary outcome: Subgroup analyses

Table 1. Interaction model estimates for Focus4TAPS by pupils' FSM eligibility

Effect	Coefficient	Standard error	95% Confidence interval	p-value	FSM subgroup effect size (95% CI)
Intercept	11.01	3.38	4.39, 17.63	0.001	
Intervention	0.41	0.58	-0.72, 1.55	0.48	
FSM eligible: Yes	-1.61	0.30	-2.19, -1.03	<0.001	
Intervention x FSM eligible: Yes	-0.21	0.41	-1.02, 0.59	0.61	0.02 (-0.13, 0.18)

Note: The p-value in the final row relates to the Intervention x FSM eligibility interaction term. The FSM subgroup effect size represents the estimated intervention effect for FSM-eligible pupils derived from the interaction model.

Table 2. Low interest in science subgroup analysis results

Outcome	Unadjusted differences in means (95% CI)	Adjusted differences in means (95% CI)	Focus4TAPS		Teaching as usual		Pooled variance
			n (missing)	variance of outcome	n (missing)	variance of outcome	
Primary outcome: Science attainment	0.199 (-0.47, 0.87)	0.508 (-0.86, 1.90)	1084 (1115)	68.127	1,081 (1,053)	58.442	63.292

Table 3. Low interest in science subgroup analysis- effect size estimations

Outcome	Focus4TAPS n (missing)	Focus4TAPS unadjusted means (95% CI)	Teaching as usual n (missing)	Teaching as usual unadjusted means (95% CI)	Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value
Primary outcome: Science attainment	1,084 (1,115)	21.47 (20.98, 21.96)	1081 (1053)	21.271 (20.82, 21.73)	2,165 (1,084; 1,081)	0.06 (-0.11, 0.24)	0.49

Table 4. High interest in science subgroup analysis results

Outcome	Unadjusted differences in means (95% CI)	Adjusted differences in means (95% CI)	Focus4TAPS		Teaching as usual		Pooled variance
			n (missing)	variance of outcome	n (missing)	variance of outcome	
Primary outcome: Science attainment	-0.19 (-0.86, 0.48)	-0.65 (-2.01, 0.71)	1,115 (1,084)	62.618	1,053 (1,081)	63.27	62.93

Table 5. High interest in science subgroup analysis- effect size estimations

Outcome	Focus4TAPS n (missing)	Focus4TAPS unadjusted means (95% CI)	Teaching as usual n (missing)	Teaching as usual unadjusted means (95% CI)	Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value
Primary outcome: Science attainment	1,115 (1,084)	23.52 (23.05, 23.98)	1053 (1081)	23.71 (23.23, 24.20)	2,168 (1,115; 1,053)	-0.08 (-0.25, 0.09)	0.37

Primary outcome: Robustness checks

Table 6. Primary outcome analysis with robust standard errors results – Science attainment

Outcome	Unadjusted differences in means (95% CI)	Adjusted differences in means (95% CI)	Focus4TAPS		Teaching as usual		Pooled variance
			n (missing)	variance of outcome	n (missing)	variance of outcome	
Primary outcome: Science attainment	0.04 (-0.40, 0.49)	0.24 (-0.85, 1.34)	2,496 (563)	67.86	2,646 (646)	64.53	66.15

Table 7. Primary outcome analysis with robust standard errors – Science attainment effect size estimation

Outcome	Focus4TAPS n (missing)	Focus4TAPS unadjusted means (95% CI)	Teaching as usual n (missing)	Teaching as usual unadjusted means (95% CI)	Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value
Primary outcome: Science attainment	2,496 (563)	22.31 (21.98, 22.63)	2,646 (646)	22.27 (21.96, 22.57)	5,142 (2,496; 2,646)	0.03 (-0.11, 0.17)	0.66

Primary outcome: Sensitivity analysis

Table 8. Imbalance at baseline analysis results – Science attainment

Outcome	Unadjusted differences in means (95% CI)	Adjusted differences in means (95% CI)	Focus4TAPS		Teaching as usual		Pooled variance
			n (missing)	variance of outcome	n (missing)	variance of outcome	
Primary outcome: Science attainment	0.04 (-0.40, 0.49)	0.59 (-0.53, 1.71)	2,496 (563)	67.86	2,646 (646)	64.53	66.15

Table 9. Imbalance at baseline analysis – Science attainment effect size estimation

Outcome	Focus4TAPS n (missing)	Focus4TAPS unadjusted means (95% CI)	Teaching as usual n (missing)	Teaching as usual unadjusted means (95% CI)	Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value
Primary outcome: Science attainment	2,496 (563)	22.31 (21.98, 22.63)	2,646 (646)	22.27 (21.96, 22.57)	5,142 (2,496; 2,646)	0.07 (-0.07, 0.21)	0.33

Table 10. Interaction model estimates for Focus4TAPS by pupils' FSM eligibility- adjusted for imbalance at baseline

Effect	Coefficient	Standard error	95% Confidence interval	p-value
Intercept	14.66	3.92	6.98, 22.35	<0.001
Intervention	0.70	0.61	-0.51, 1.90	0.26
FSM eligible: Yes	-1.04	0.33	-1.69, -0.40	0.001
Intervention x FSM eligible: Yes	-0.35	0.46	-1.24, 0.55	0.45

Table 11. Primary outcome analysis with alternative baseline specification– Science attainment

Outcome	Unadjusted differences in means (95% CI)	Adjusted differences in means (95% CI)	Focus4TAPS		Teaching as usual		Pooled variance
			n (missing)	variance of outcome	n (missing)	variance of outcome	
Primary outcome: Science attainment	0.04 (-0.40, 0.49)	0.48 (-0.61, 1.58)	2,496 (563)	67.86	2,646 (646)	64.53	66.15

Table 12. Primary outcome analysis with alternative baseline specification – Science attainment effect size estimation

Outcome	Focus4TAPS n (missing)	Focus4TAPS unadjusted means (95% CI)	Teaching as usual n (missing)	Teaching as usual unadjusted means (95% CI)	Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value
Primary outcome: Science attainment	2,496 (563)	22.31 (21.98, 22.63)	2,646 (646)	22.27 (21.96, 22.57)	5,142 (2,496; 2,646)	0.06 (-0.08, 0.19)	0.40

Table 13. Primary outcome analysis with alternative baseline specification and imbalance at baseline – science attainment

Outcome	Unadjusted differences in means (95% CI)	Adjusted differences in means (95% CI)	Focus4TAPS		Teaching as usual		Pooled variance
			n (missing)	variance of outcome	n (missing)	variance of outcome	
Primary outcome: Science attainment	0.37 (-0.12, 0.87)	0.71 (-0.42, 1.83)	1,989 (1070)	67.23	2,133 (1,159)	63.38	65.24

Table 14. Primary outcome analysis with alternative baseline specification and imbalance at baseline – Science attainment effect size estimation

Outcome	Focus4TAPS n (missing)	Focus4TAPS unadjusted means (95% CI)	Teaching as usual n (missing)	Teaching as usual unadjusted means (95% CI)	Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value
Primary outcome: Science attainment	1,989 (1,070)	22.51 (22.15, 22.87)	2,133 (1,159)	22.14 (21.80, 22.47)	4,122 (1,989; 2,133)	0.09 (-0.05, 0.23)	0.24

Table 15. Primary outcome analysis with alternative baseline specification and imbalance at baseline for FSM subgroup – science attainment

Outcome			Focus4TAPS		Teaching as usual		Pooled variance
	Unadjusted differences in means (95% CI)	Adjusted differences in means (95% CI)	n (missing)	variance of outcome	n (missing)	variance of outcome	
Primary outcome: Science attainment	-0.02 (-0.90, 0.86)	1.20 (-0.31, 2.72)	677 (416)	65.72	610 (393)	61.96	63.94

Table 16. Primary outcome analysis with alternative baseline specification and imbalance at baseline for FSM subgroup – Science attainment effect size estimation

Outcome	Focus4TAPS n (missing)	Focus4TAPS unadjusted means (95% CI)	Teaching as usual n (missing)	Teaching as usual unadjusted means (95% CI)	Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value
Primary outcome: Science attainment	677 (416)	19.56 (18.95, 20.17)	610 (393)	19.58 (18.95, 20.21)	1,287 (677; 610)	0.15 (-0.04, 0.34)	0.15

CACE analysis

Table 17. CACE analysis for science attainment

	Total n	Predictor	Adjusted difference in means	Effect size (95% CI)	p-value
IV model: Stage 1	5,142	Focus4TAPS intervention status	1.13	N/A	<0.001
IV model: Stage 2	5,142	Compliance indicator	0.19	0.02 (-0.09, 0.14)	0.69

Table 118. CACE analysis for science attainment – First compliance criterion only

	Total n	Predictor	Adjusted difference in means	Effect size (95% CI)	p-value
IV model: Stage 1	5,142	Focus4TAPS intervention status	0.96	N/A	<0.001
IV model: Stage 2	5,142	Compliance indicator	0.23	0.03 (-0.11, 0.17)	0.69

Appendix E: Missing data analysis

Table 2. Determinants of data missingness- Primary outcome (science attainment score)

Term	Estimate	Standard Error	Statistic	P-value
(Intercept)	-2.61	1.26	-2.06	0.04
Treatment allocation: Teaching as usual (reference)	—	—	—	—
Treatment allocation: Focus4TAPS	-0.05	0.12	-0.41	0.68
Gender: Boy (reference)	—	—	—	—
Gender: Girl	0.14	0.07	1.93	0.05
Gender: Missing	-12.88	196.97	-0.07	0.95
Age in months	0.05	0.13	0.42	0.67
FSM eligible: No (reference)	—	—	—	—
FSM eligible: Yes	0.42	0.08	5.39	< 0.001
FSM eligible: Missing	1.11	1.46	0.76	0.45
KS1 maths: Below expected standard (reference)	—	—	—	—
KS1 maths: Expected standard or above	-0.21	0.11	-1.85	0.06
KS1 maths: Missing	0.74	0.15	5.01	< 0.001
KS1 reading: Below expected standard (reference)	—	—	—	—
KS1 reading: Expected standard or above	-0.25	0.11	-2.30	0.02
Baseline interest enjoyment subscale score	-0.09	0.10	-0.88	0.38
Baseline confidence science subscale score	-0.17	0.09	-1.85	0.07
Baseline perception teacher subscale score	0.15	0.11	1.28	0.20
Baseline self-regulation subscale score	-0.07	0.09	-0.80	0.43
Baseline self-efficacy subscale score	0.02	0.09	0.17	0.87
Baseline working scientifically subscale score	0.23	0.01	18.73	< 0.001

Term	Estimate	Standard Error	Statistic	P-value
Baseline wider benefits subscale score	-0.12	0.08	-1.46	0.14
Region: Bury (reference)	—	—	—	—
Region: Derby	0.50	0.20	2.52	0.01
Region: Essex	0.60	0.20	2.97	0.00
Region: Liverpool	-0.13	0.21	-0.63	0.53
Region: Newcastle	0.30	0.18	1.69	0.09
Region: Nottingham	0.57	0.21	2.69	0.01
Region: SE London	0.46	0.21	2.24	0.03
Region: Sheffield	0.41	0.19	2.21	0.03
Region: Southampton	0.45	0.21	2.20	0.03
Region: Suffolk	0.06	0.22	0.27	0.79
Region: Sunderland	0.20	0.19	1.05	0.29
Region: West London	0.17	0.22	0.74	0.46
Region: Wolverhampton	-0.18	0.21	-0.86	0.39
KS1 attainment: Missing (reference)	—	—	—	—
KS1 attainment: Below median	-0.24	0.18	-1.35	0.18
KS1 attainment: Above median	-0.29	0.15	-1.96	0.05

Table 3. Determinants of data missingness- Primary outcome model covariates

Term	Estimate	Standard Error	Statistic	P-value
(Intercept)	-4.07	0.51	-7.99	< 0.001
Treatment allocation: Teaching as usual (reference)	—	—	—	—
Treatment allocation: Focus4TAPS	0.07	0.12	0.57	0.57
Gender: Boy (reference)	—	—	—	—
Gender: Girl	-0.05	0.12	-0.39	0.70
Gender: Missing	12.60	324.75	0.04	0.97
FSM eligible: No (reference)	—	—	—	—
FSM eligibility: Yes	-0.64	0.14	-4.57	< 0.001
FSM eligibility: Missing	2.60	1.42	1.83	0.07
Baseline interest enjoyment subscale score	0.13	0.15	0.88	0.38
Baseline confidence science subscale score	-0.22	0.14	-1.62	0.10
Baseline perception teacher subscale score	0.10	0.18	0.56	0.57
Baseline self-regulation subscale score	0.35	0.13	2.66	0.01
Baseline self-efficacy subscale score	-0.10	0.13	-0.80	0.43
Baseline working scientifically subscale score	0.04	0.02	1.61	0.11
Baseline wider benefits subscale score	0.09	0.12	0.48	0.48

Appendix F: Secondary outcome analyses

Table 1. Secondary outcome analyses - results

Outcome	Unadjusted differences in means	Adjusted differences in means	Focus4TAPS		Teaching as usual		Pooled variance
			n (missing)	Variance of outcome	n (missing)	Variance of outcome	
Interest and enjoyment in science	0.04 (0.00, 0.08)	0.11 (0.03, 0.19)	2,283 (776)	0.47	2,215 (1,077)	0.45	0.46
Confidence in science	0.08 (0.04, 0.11)	0.10 (0.03, 0.16)	2,289 (770)	0.45	2,215 (1,077)	0.42	0.43
Perceptions of science teachers' teaching	0.01 (-0.02, 0.05)	0.10 (0.02, 0.18)	2,278 (781)	0.36	2,201 (1091)	0.36	0.36
Self-regulation of learning in science	0.02 (-0.02, 0.06)	0.13 (0.05, 0.21)	2,258 (801)	0.54	2,197 (1,095)	0.50	0.52
Self-efficacy for working scientifically	0.05 (0.01, 0.09)	0.08 (0.00, 0.15)	2,226 (833)	0.47	2,164 (1,128)	0.46	0.47
Working Scientifically beliefs	0.03 (0, 0.07)	0.06 (0.01, 0.12)	2,189 (870)	0.30	2,138 (1,154)	0.31	0.30
Wider benefits of science	0.03 (-0.01, 0.06)	0.05 (-0.03, 0.12)	2,235 (824)	0.40	2,172 (1,120)	0.38	0.39

Table 2. Secondary analyses – effect size estimation with robust standard errors

Outcome	Unadjusted means				Effect size			Effect size – robust standard errors		
	Focus4TAPS		Teaching as usual		Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value	Total n (Focus4TAPS; teaching as usual)	Hedges g (95% CI)	p-value
	n (missing)	Mean (95% CI)	n (missing)	Mean (95% CI)						
Interest and enjoyment in science	2,283 (776)	3.04 (3.01, 3.07)	2,215 (1,077)	2.99 (2.97, 3.02)	4,498 (2,283; 2,215)	0.16 (0.03, 0.29)	0.02	4,498 (2,283; 2,215)	0.16 (0.04, 0.29)	0.01
Confidence in science	2,289 (770)	2.82 (2.79, 2.85)	2,215 (1,077)	2.74 (2.72, 2.77)	4,504 (2,289; 2,215)	0.15 (0.04, 0.26)	0.01	4,504 (2,289; 2,215)	0.15 (0.05, 0.24)	0.00
Perceptions of science teachers' teaching	2,278 (781)	3.18 (3.15, 3.2)	2,201 (1,091)	3.16 (3.14, 3.19)	4479 (2,278; 2,201)	0.17 (0.02, 0.32)	0.04	4,479 (2,278; 2,201)	0.17 (0.03, 0.31)	0.02
Self-regulation of learning in science	2,258 (801)	2.80 (2.77, 2.83)	2,197 (1,095)	2.78 (2.75, 2.81)	4,455 (2,258; 2,197)	0.18 (0.06, 0.31)	0.01	4,455 (2,258; 2,197)	0.18 (0.07, 0.30)	0.00
Self-efficacy for working scientifically	2,226 (833)	3.03 (3.01, 3.06)	2,164 (1,128)	2.98 (2.95, 3.01)	4,390 (2,226; 2,164)	0.11 (0.01, 0.24)	0.04	4,390 (2,226; 2,164)	0.11 (0.00, 0.23)	0.04
Working Scientifically beliefs	2,189 (870)	3.37 (3.35, 3.40)	2,138 (1,154)	3.34 (3.32, 3.37)	4,327 (2,189; 2,138)	0.12 (0.01, 0.23)	0.05	4,327 (2,189; 2,138)	0.12 (0.01, 0.22)	0.03
Wider benefits of science	2,235 (824)	3.44 (3.41, 3.46)	2,172 (1,120)	3.41 (3.38, 3.44)	4,407 (2,235; 2,172)	0.08 (-0.03, 0.19)	0.18	4,407 (2,235; 2,172)	0.08 (-0.04, 0.20)	0.20

FSM sub-group analyses

We examined the impact of Focus4TAPS on attitudes and beliefs towards science among pupils who had been eligible for free school meals (FSM) in the last six years.

An interaction model was also estimated to assess whether Focus4TAPS had a different effect for FSM-eligible pupils compared with non-FSM pupils. In this model, each secondary outcome was regressed on group allocation, the FSM indicator, and the interaction between treatment allocation and FSM status, while controlling for the pupil's baseline score for that outcome, randomisation strata, and age in months.

Table 4. FSM subgroup analyses results

Outcome	Unadjusted differences in means	Adjusted differences in means	Focus4TAPS		Teaching as usual		Pooled variance
			n (missing)	Variance of outcome	n (missing)	Variance of outcome	
Interest and enjoyment in science	0.02 (-0.05, 0.10)	0.12 (-0.01, 0.24)	742 (1,541)	0.50	648 (1,567)	0.48	0.49
Confidence in science	0.05 (-0.02, 0.12)	0.11 (-0.00, 0.23)	749 (1,540)	0.46	647 (1,568)	0.41	0.44
Perceptions of science teachers' teaching	0.05 (-0.02, 0.11)	0.14 (0.02, 0.27)	744 (1,534)	0.39	644 (1,557)	0.39	0.39
Self-regulation of learning in science	0.06 (-0.02, 0.14)	0.19 (0.05, 0.33)	732 (1,526)	0.52	639 (1,558)	0.53	0.53
Self-efficacy for working scientifically	0.04 (-0.04, 0.12)	0.11 (-0.03, 0.25)	723 (1,503)	0.53	628 (1,536)	0.49	0.51
Working Scientifically beliefs	0.02 (-0.05, 0.08)	0.05 (-0.06, 0.16)	706 (1,483)	0.39	617 (1,521)	0.33	0.36
Wider benefits of science	0.04 (-0.04, 0.11)	0.02 (-0.10, 0.14)	725 (1,510)	0.46	631 (1,541)	0.43	0.45

Table 5. Interaction effects between Focus4TAPS and pupils' FSM eligibility (effect sizes and confidence intervals)

Outcome	Effect size		Model coefficient for interaction effect			
	Total n	Hedges g (95% CI)	Coefficient	Model p-value	Romano- Wolf p-value	Romano-Wolf CI
Interest and enjoyment in science	4,498	0.12 (-0.09, 0.32)	0.00	0.794	0.995	-0.94, 0.95
Confidence in science	4,504	0.07 (-0.12, 0.26)	-0.03	0.683	0.975	-1.43, 1.38
Perceptions of science teachers' teaching	4,479	0.16 (-0.05, 0.37)	0.04	0.261	0.465	-0.07, 0.16
Self-regulation of learning in science	4,455	0.19 (-0.03, 0.41)	0.06	0.209	0.382	-0.07, 0.18
Self-efficacy for working scientifically	4,390	0.10 (-0.11, 0.31)	0.01	0.984	1.000	NA
Working Scientifically beliefs	4,327	0.06 (-0.13, 0.24)	-0.01	0.841	0.995	-2.84, 2.82
Wider benefits of science	4,407	0.06 (-0.14, 0.25)	0.00	0.989	1.000	NA

Note: Where Romano-Wolf confidence intervals are missing, these could not be calculated due to p-values of 1.

Table 6. Interaction model estimates for Focus4TAPS by pupils' FSM eligibility

Outcome	Model coefficients		
	Intervention	Subgroup effect (eligible for FSM)	Subgroup - interaction term
Interest and enjoyment in science	0.11	-0.03	0.00
Confidence in science	0.11	-0.04	-0.03
Perceptions of science teachers	0.09	-0.02	0.04
Self-regulation of learning in science	0.11	-0.02	0.06
Self-efficacy for working scientifically	0.08	-0.07	0.01
Working Scientifically beliefs	0.07	-0.09	-0.01
Wider benefits of science	0.06	-0.09	0.00

Additional subgroup interaction effects

Further subgroup analyses examined whether participation in Focus4TAPS had differential effects across the following pupil groups:

1. Gender
2. Exposure to science
3. KS1 maths category
4. Pupils' pre-Focus4TAPS intervention interest in science

These analyses were undertaken using interaction models, in which each secondary outcome model was extended to include a subgroup indicator and a subgroup-by-Focus4TAPS interaction term. A significant interaction term would reflect a differential effect across the subgroups.

Table 7. Interaction effects between Focus4TAPS and pupils' gender (effect sizes and confidence intervals)

Outcome	Effect size		Model coefficient for interaction effect			
	Total n	Hedges g (95% CI)	Coefficient	Model p-value	Romano-Wolf p-value	Romano-Wolf CI
Interest and enjoyment in science	4,498	0.07 (-0.13, 0.26)	-0.04	0.16	0.21	-0.11, 0.02
Confidence in science	4,504	0.05 (-0.14, 0.23)	-0.05	0.16	0.21	-0.12, 0.03
Perceptions of science teachers' teaching	4,479	0.03 (-0.17, 0.23)	-0.06	0.07	0.07	-0.13, 0.00
Self-regulation of learning in science	4,455	0.08 (-0.13, 0.28)	-0.06	0.16	0.21	-0.15, 0.03
Self-efficacy for working scientifically	4,390	0.06 (-0.14, 0.26)	-0.02	0.67	0.89	-0.24, 0.21
Working Scientifically beliefs	4,327	0.05 (-0.13, 0.23)	-0.01	0.89	0.91	-0.11, 0.1
Wider benefits of science	4,407	0.06 (-0.13, 0.25)	0.01	0.78	0.91	-0.19, 0.21

Table 8. Interaction model estimates for Focus4TAPS by pupils' gender

Outcome	Model coefficients		
	Intervention	Subgroup effect (Female)	Subgroup - interaction term
Interest and enjoyment in science	0.13	-0.01	-0.04
Confidence in science	0.12	-0.01	-0.05
Perceptions of science teachers' teaching	0.13	0.03	-0.06
Self-regulation of learning in science	0.16	0.06	-0.06
Self-efficacy for working scientifically	0.09	0.02	-0.02
Working Scientifically beliefs	0.07	0.05	-0.01
Wider benefits of science	0.04	0.00	0.01

Table 9. Interaction effects between Focus4TAPS and pupils' exposure to science (effect sizes and confidence intervals)

Outcome	Effect size		Model coefficient for interaction effect			
	Total n	Hedges g (95% CI)	Coefficient	Model p-value	Romano-Wolf p-value	Romano-Wolf CI
Interest and enjoyment in science	4,333	0.12 (-0.08, 0.32)	0.01	0.75	0.88	-0.06, 0.07
Confidence in science	4,325	0.12 (-0.07, 0.30)	0.03	0.38	0.69	-0.09, 0.15
Perceptions of science teachers' teaching	4,300	0.13 (-0.07, 0.33)	0.03	0.50	0.79	-0.15, 0.19
Self-regulation of learning in science	4,267	0.10 (-0.11, 0.31)	-0.03	0.50	0.79	-0.24, 0.18
Self-efficacy for working scientifically	4,199	0.14 (-0.07, 0.34)	0.05	0.12	0.17	-0.02, 0.12
Working Scientifically beliefs	4,162	0.09 (-0.09, 0.28)	0.03	0.41	0.70	-0.11, 0.16
Wider benefits of science	4,150	0.06 (-0.13, 0.26)	0.01	0.86	0.88	-0.08, 0.10

Table 10. Interaction model estimates for Focus4TAPS by pupils' exposure to science

Outcome	Model coefficients		
	Intervention	Subgroup effect (high exposure to science)	Subgroup - interaction term
Interest and enjoyment in science	0.11	0.05	0.01
Perceptions of science teachers' teaching	0.09	0.01	0.03
Self-regulation of learning in science	0.14	0.08	-0.03
Self-efficacy for working scientifically	0.06	0.04	0.05
Working Scientifically beliefs	0.05	0.04	0.03
Wider benefits of science	0.05	0.05	0.01

Table 11. Interaction effects between Focus4TAPS and pupils' KS1 maths category (effect sizes and confidence intervals)

Outcome	Effect size		Model coefficient for interaction effect			
	Total n	Hedges g (95% CI)	Coefficient	Model p-value	Romano-Wolf p-value	Romano-Wolf CI
Interest and enjoyment in science	4,312	0.20 (-0.02, 0.42)	0.10	0.15	0.26	-0.07, 0.26
Confidence in science	4,319	0.13 (-0.08, 0.34)	0.03	0.82	0.93	-0.66, 0.73
Perceptions of science teachers' teaching	4,293	0.12 (-0.10, 0.35)	0.01	0.88	0.93	-0.13, 0.15
Self-regulation of learning in science	4,270	0.15 (-0.09, 0.39)	0.00	0.74	0.93	-0.01, 0.02
Self-efficacy for working scientifically	4,210	0.13 (-0.10, 0.36)	0.06	0.30	0.48	-0.09, 0.2
Working Scientifically beliefs	4,146	0.10 (-0.11, 0.31)	0.03	0.51	0.78	-0.15, 0.2
Wider benefits of science	4,225	0.12 (-0.10, 0.33)	0.06	0.18	0.29	-0.05, 0.18

Table 12. Interaction model estimates for Focus4TAPS by pupils' KS1 maths category

Outcome	Model coefficients		
	Intervention	Subgroup effect (Expected standard or above)	Subgroup - interaction term
Interest and enjoyment in science	0.06	-0.05	0.10
Confidence in science	0.08	0.10	0.03
Perceptions of science teachers' teaching	0.11	-0.01	0.01
Self-regulation of learning in science	0.15	0.00	0.00
Self-efficacy for working scientifically	0.05	0.10	0.06
Working Scientifically beliefs	0.06	0.13	0.03
Wider benefits of science	0.02	0.10	0.06

Table 13. Interaction effects between Focus4TAPS and pupils' pre-intervention interest in science (effect sizes and confidence intervals)

Outcome	Effect size		Model coefficient for interaction effect			
	Total n	Hedges g (95% CI)	Coefficient	Model p-value	Romano-Wolf p-value	Romano-Wolf CI
Confidence in science	4,494	0.05 (-0.13, 0.24)	-0.04	0.24	0.42	-0.12, 0.05
Perceptions of science teachers' teaching	4,466	0.10 (-0.10, 0.30)	0.01	0.89	0.99	-0.44, 0.45
Self-regulation of learning in science	4,443	0.12 (-0.09, 0.33)	-0.01	0.78	0.99	-0.54, 0.53
Self-efficacy for working scientifically	4,376	0.06 (-0.14, 0.26)	-0.02	0.72	0.99	-1.53, 1.5
Working Scientifically beliefs	4,315	0.04 (-0.14, 0.23)	-0.01	0.72	0.99	-0.95, 0.93
Wider benefits of science	4,395	0.05 (-0.15, 0.24)	0.00	0.91	0.99	-0.18, 0.19

Table 14. Interaction model estimates for Focus4TAPS by pupils' pre-intervention interest in science

Outcome	Model coefficients		
	Intervention	Subgroup effect (High interest)	Subgroup - interaction term
Confidence in science	0.11	0.07	-0.04
Perceptions of science teachers' teaching	0.09	0.08	0.01
Self-regulation of learning in science	0.13	0.15	-0.01
Self-efficacy for working scientifically	0.08	0.12	-0.02
Working Scientifically beliefs	0.06	0.11	-0.01
Wider benefits of science	0.04	0.10	0.00

Table 14. Interaction effects between Focus4TAPS and pupils' FSM eligibility (effect sizes and confidence intervals) – adjusted for imbalance at baseline

Outcome	Effect size		Model coefficient for interaction effect			
	Total n	Hedges g (95% CI)	Coefficient	Model p-value	Romano-Wolf p-value	Romano-Wolf CI
Interest and enjoyment in science	4,498	0.11 (-0.12, 0.34)	0.00	0.92	0.94	0; 0
Confidence in science	4,504	0.04 (-0.17, 0.25)	-0.04	0.39	0.70	-0.13; 0.05
Perceptions of science teachers' teaching	4,479	0.12 (-0.12, 0.36)	0.03	0.50	0.81	-0.06; 0.13
Self-regulation of learning in science	4,455	0.14 (-0.1, 0.38)	0.02	0.66	0.90	-0.08; 0.12
Self-efficacy for working scientifically	4,390	0.08 (-0.15, 0.31)	0.00	0.81	0.94	-0.03; 0.03
Working Scientifically beliefs	4,327	0 (-0.21, 0.2)	-0.05	0.22	0.39	-0.12; 0.03
Wider benefits of science	4,407	0 (-0.22, 0.21)	-0.05	0.17	0.33	-0.13; 0.02

Note: where Romano-Wolf confidence interval is missing, these could not be calculated due to the p-value of 1.

Table 15. Interaction model estimates for Focus4TAPS by pupils' FSM eligibility – adjusted for imbalance at baseline

Outcome	Model coefficients		
	Intervention	Subgroup effect (eligible for FSM)	Subgroup - interaction term
Interest and enjoyment in science	0.11	-0.03	0.00
Confidence in science	0.10	-0.04	-0.04
Perceptions of science teachers' teaching	0.07	-0.02	0.03
Self-regulation of learning in science	0.11	-0.03	0.02
Self-efficacy for working scientifically	0.07	-0.06	0.00
Working Scientifically beliefs	0.08	-0.08	-0.05
Wider benefits of science	0.08	-0.05	-0.05

Appendix G: Distribution of secondary outcome variables

Appendix G presents tables of descriptive statistics for the baseline and endline measures of each secondary outcome, along with histograms showing the distribution of each outcome for the full sample at baseline and separately for the Focus4TAPS and teaching as usual groups at endline.

Table 1. Summary of secondary outcomes at baseline

Outcome	Group	Sample size	Mean	Standard deviation	Skewness	Kurtosis
Interest and enjoyment in science	Total	4,498	3.16	0.66	-0.80	0.05
	Teaching as usual	2,215	3.17	0.64	-0.82	0.24
	Focus4TAPS	2,283	3.16	0.67	-0.77	-0.11
Confidence in science	Total	4,504	2.92	0.65	-0.46	-0.28
	Teaching as usual	2,215	2.92	0.65	-0.45	-0.24
	Focus4TAPS	2,289	2.93	0.65	-0.47	-0.32
Perceptions of science teachers' teaching	Total	4,479	3.27	0.56	-1.02	1.12
	Teaching as usual	2,201	3.29	0.55	-1.06	1.23
	Focus4TAPS	2,278	3.25	0.57	-0.99	1.01
Self-regulation of learning in science	Total	4,455	2.92	0.68	-0.61	-0.05
	Teaching as usual	2,197	2.93	0.67	-0.61	-0.04
	Focus4TAPS	2,258	2.90	0.69	-0.60	-0.07
Self-efficacy for working scientifically	Total	4,390	2.97	0.68	-0.60	0.03
	Teaching as usual	2,164	2.98	0.68	-0.57	-0.04
	Focus4TAPS	2,226	2.96	0.68	-0.62	0.09
Working Scientifically beliefs	Total	4,327	3.34	0.54	-1.19	2.11
	Teaching as usual	2,138	3.35	0.54	-1.17	2.02
	Focus4TAPS	2,189	3.33	0.55	-1.21	2.17
Wider benefits of science	Total	4,407	3.34	0.64	-0.98	0.67
	Teaching as usual	2,172	3.34	0.63	-0.95	0.58
	Focus4TAPS	2,235	3.34	0.65	-1.01	0.73

Table 2. Summary of secondary outcomes at endline

Outcome	Group	Sample size	Mean	Standard deviation	Skewness	Kurtosis
Interest and enjoyment in science	Total	4,498	3.02	0.68	-0.53	-0.36
	Focus4TAPS	2,283	3.04	0.69	-0.55	-0.37
	Teaching as usual	2,215	2.99	0.67	-0.52	-0.35
Confidence in science	Total	4,504	2.78	0.66	-0.30	-0.54
	Focus4TAPS	2,289	2.82	0.67	-0.37	-0.50
	Teaching as usual	2,215	2.74	0.65	-0.22	-0.55
Perceptions of science teachers' teaching	Total	4,479	3.17	0.60	-0.80	0.44
	Focus4TAPS	2,278	3.18	0.60	-0.80	0.45
	Teaching as usual	2,201	3.16	0.60	-0.80	0.42
Self-regulation of learning in science	Total	4,455	2.79	0.72	-0.49	-0.27
	Focus4TAPS	2,258	2.80	0.73	-0.49	-0.28
	Teaching as usual	2,197	2.78	0.71	-0.49	-0.26
Self-efficacy for working scientifically	Total	4,390	3.01	0.68	-0.62	0.03
	Focus4TAPS	2,226	3.03	0.68	-0.64	0.06
	Teaching as usual	2,164	2.98	0.68	-0.60	0.00
Working Scientifically beliefs	Total	4,327	3.36	0.55	-1.25	2.23
	Focus4TAPS	2,189	3.37	0.55	-1.34	2.61
	Teaching as usual	2,138	3.34	0.56	-1.15	1.87
Wider benefits of science	Total	4,407	3.42	0.63	-1.18	1.20
	Focus4TAPS	2,235	3.44	0.64	-1.24	1.34
	Teaching as usual	2,172	3.41	0.62	-1.11	1.04

Figure 1. Distribution of Interest and enjoyment in science at baseline (whole analysis sample)

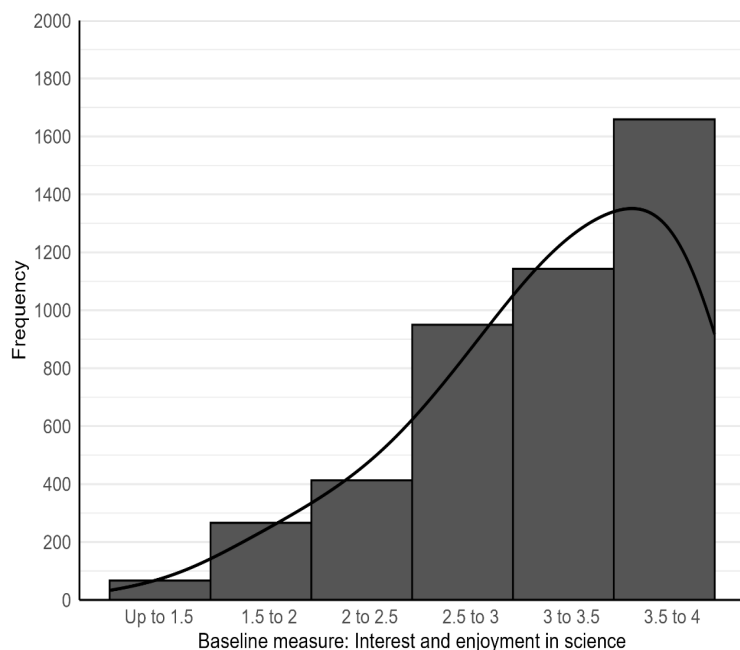
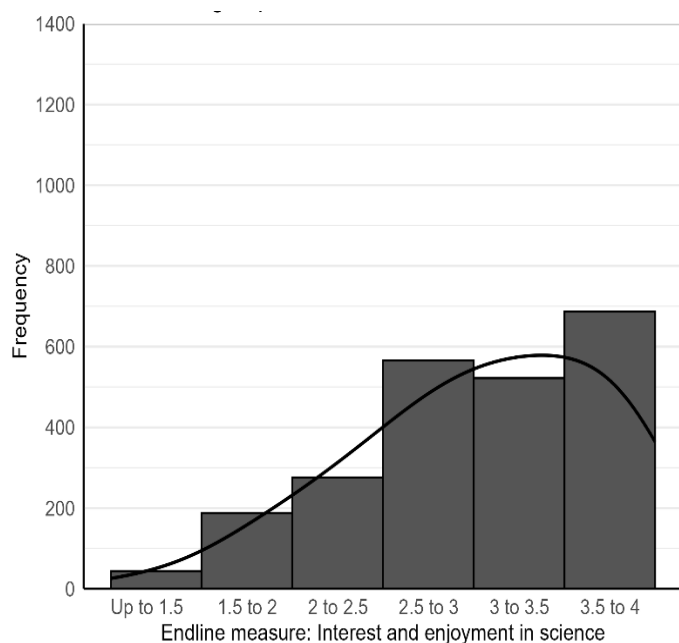


Figure 2. Distribution of Interest and enjoyment in science at endline by group

a.) Focus4TAPS



b.) Teaching as usual

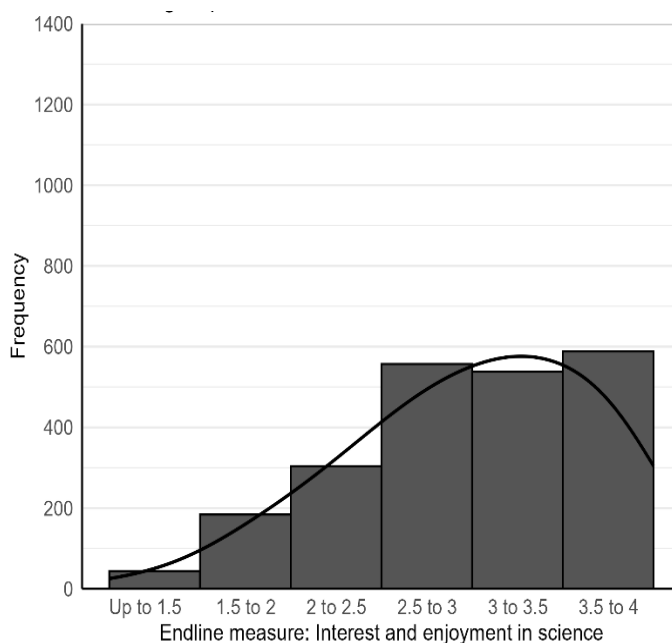


Figure 3. Distribution of confidence in science at baseline (whole analysis sample)

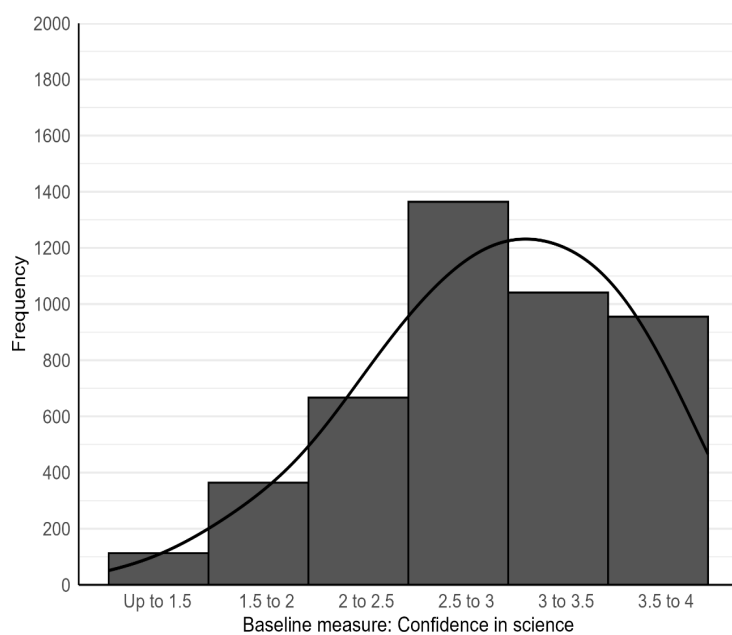


Figure 4. Distribution of confidence in science at endline by group

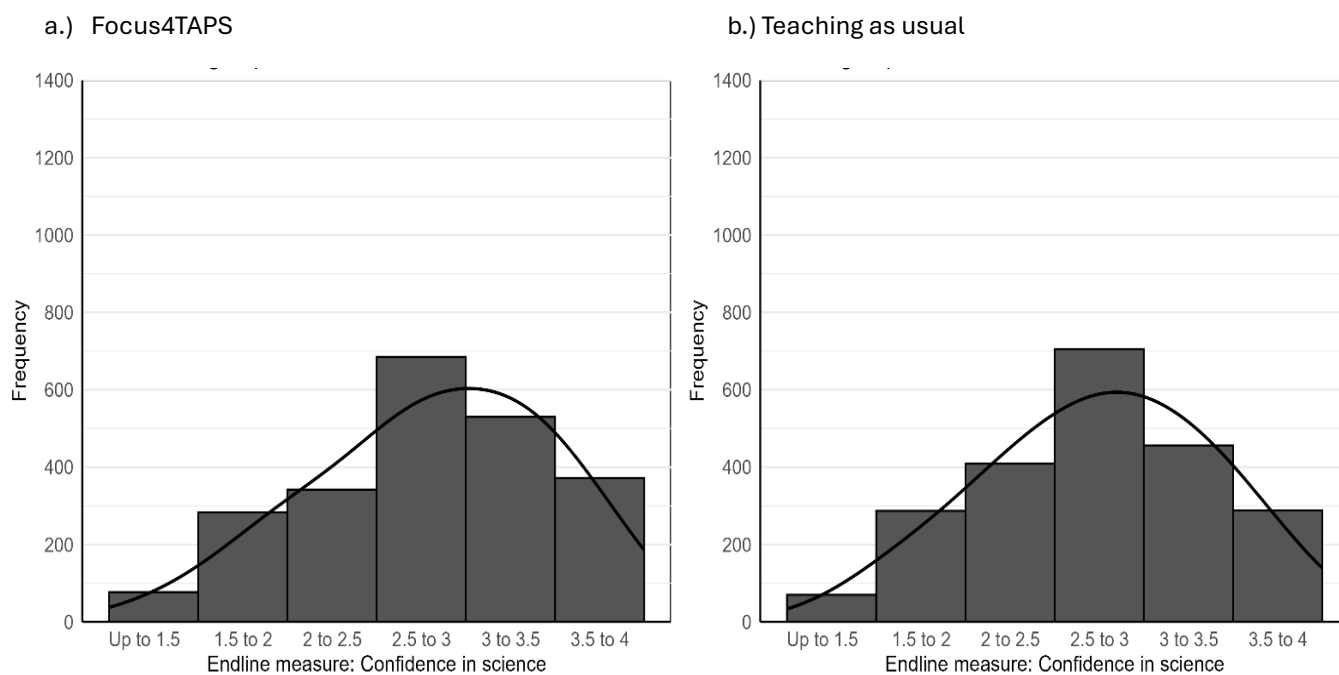


Figure 5. Distribution of perception of science teachers' teaching at baseline (whole analysis sample)

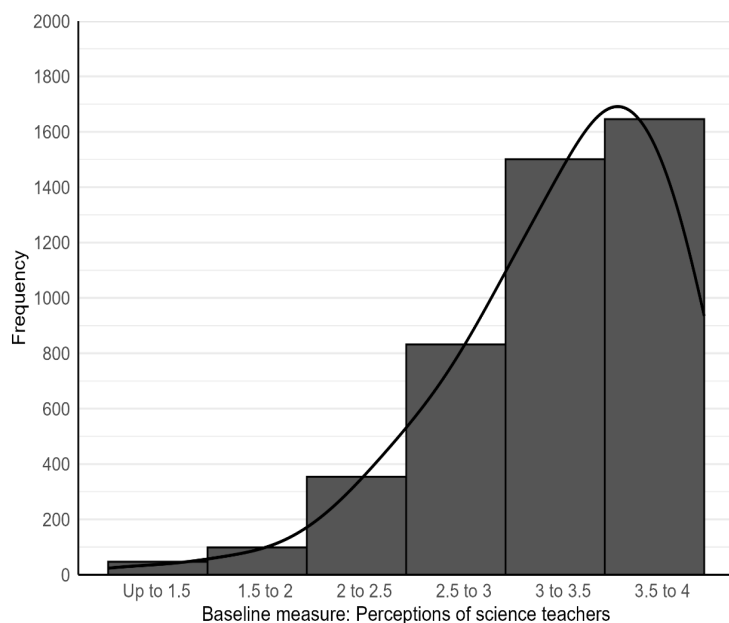


Figure 6. Distribution of perception of science teachers' teaching at endline by group

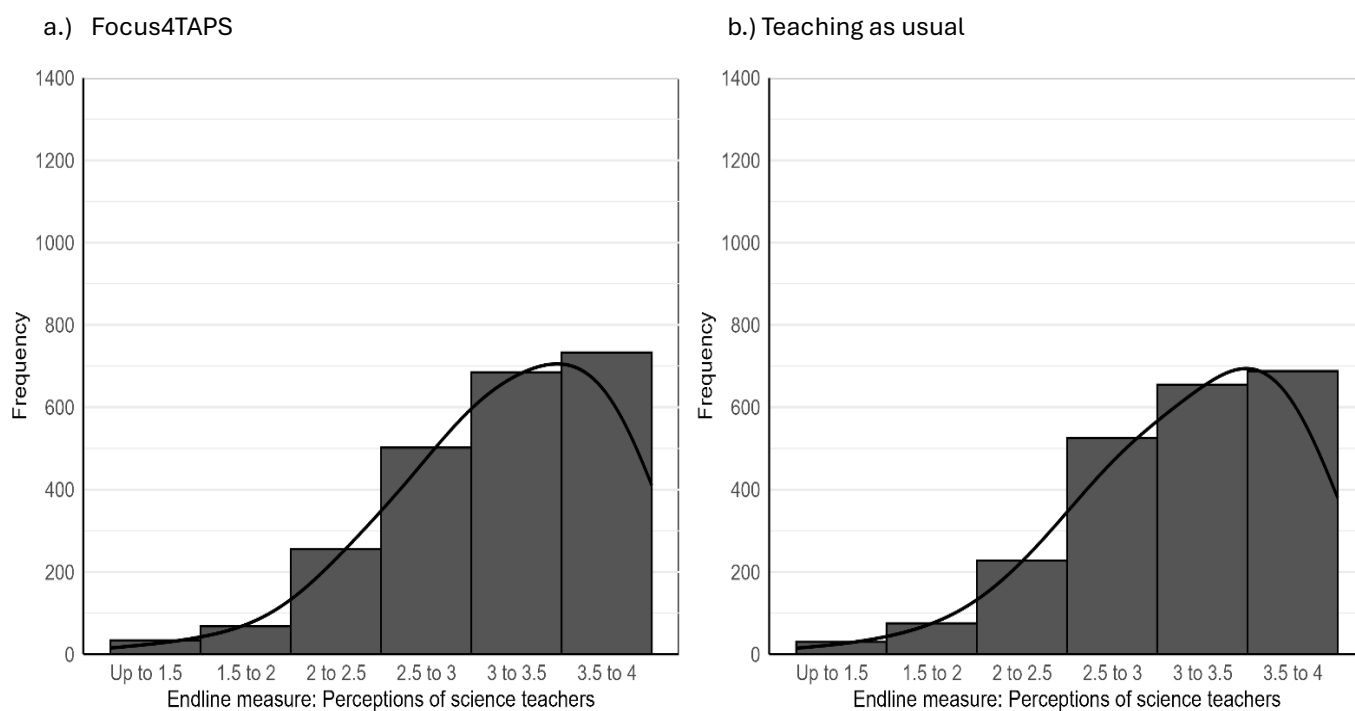


Figure 7. Distribution of self-regulation at baseline (whole analysis sample)

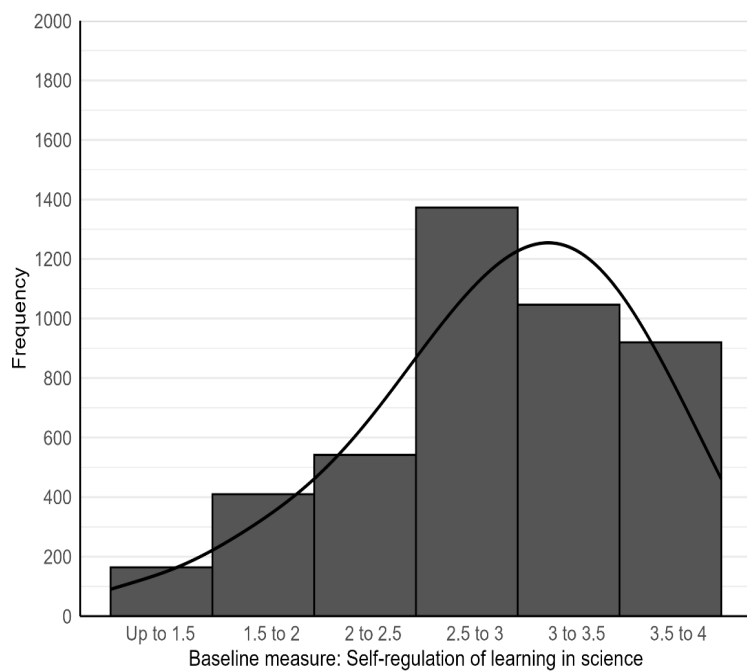


Figure 8. Distribution of self-regulation at endline by group

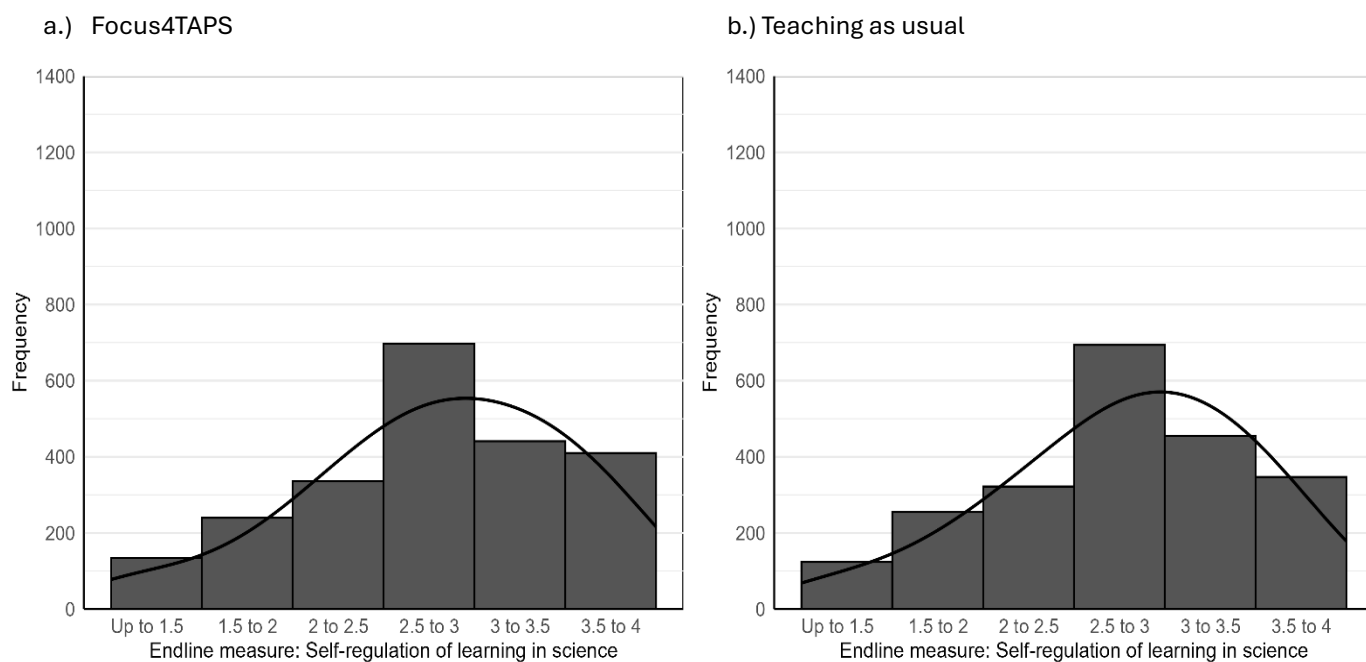


Figure 9. Distribution of self-efficacy for Working Scientifically at baseline (whole analysis sample)

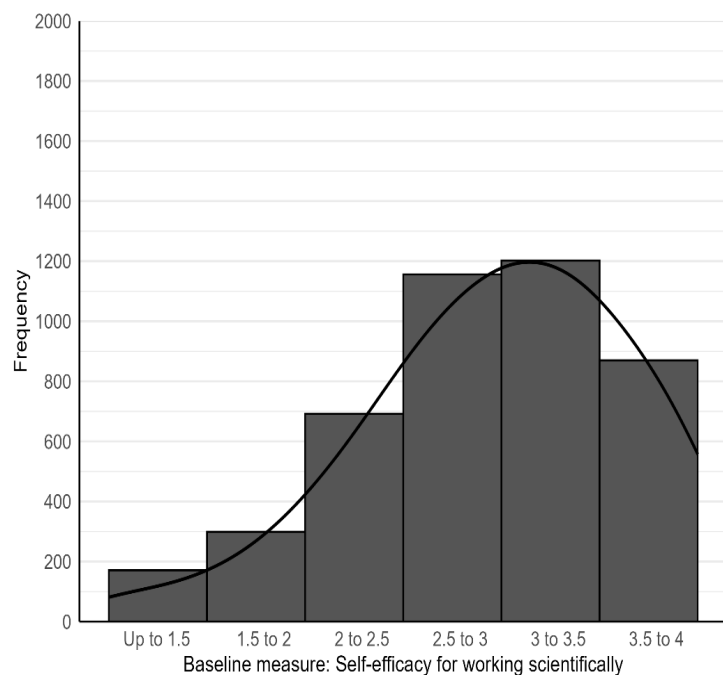


Figure 10. Distribution of self-efficacy for Working Scientifically at endline by group

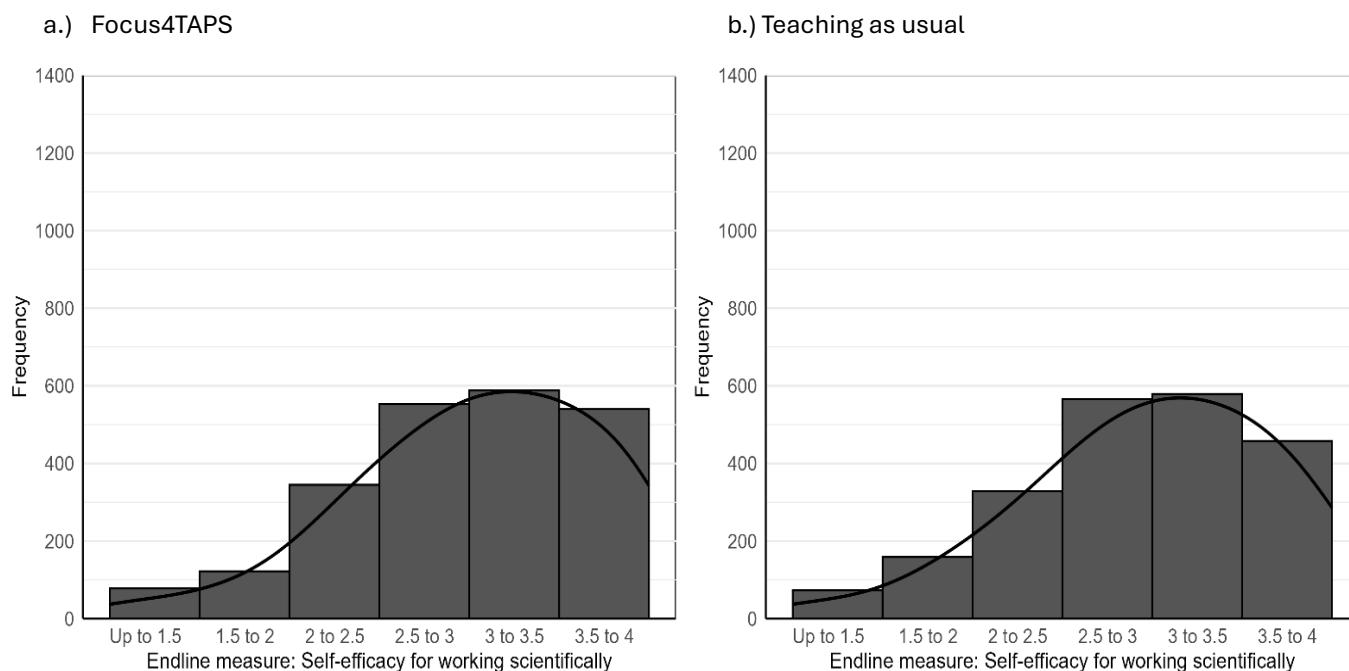


Figure 11. Distribution of Working Scientifically beliefs at baseline (whole analysis sample)

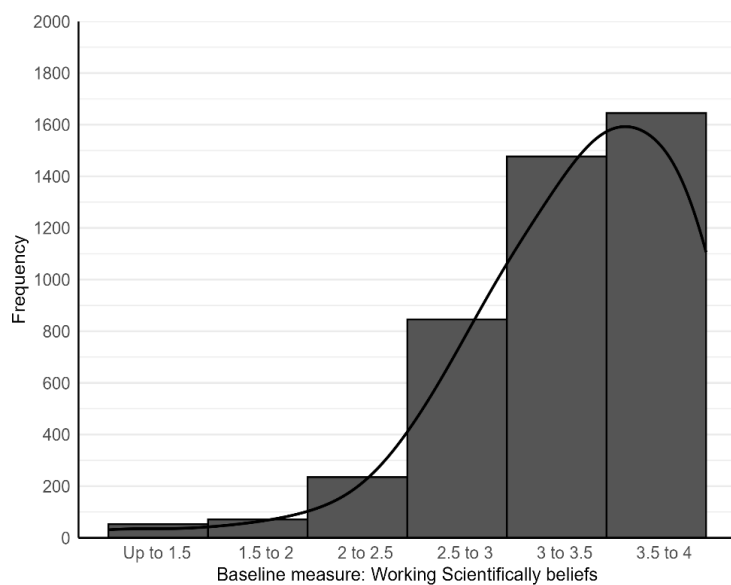


Figure 12. Distribution of Working Scientifically beliefs at endline by group

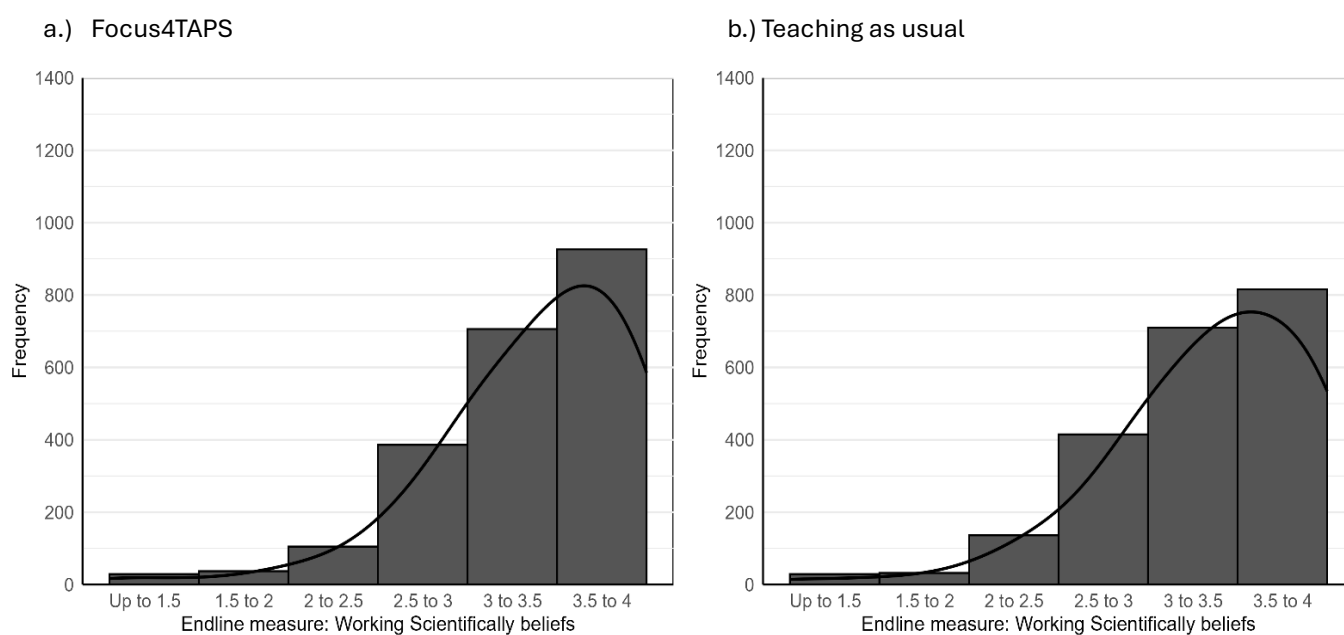


Figure 13. Distribution of wider benefits of science at baseline (whole analysis sample)

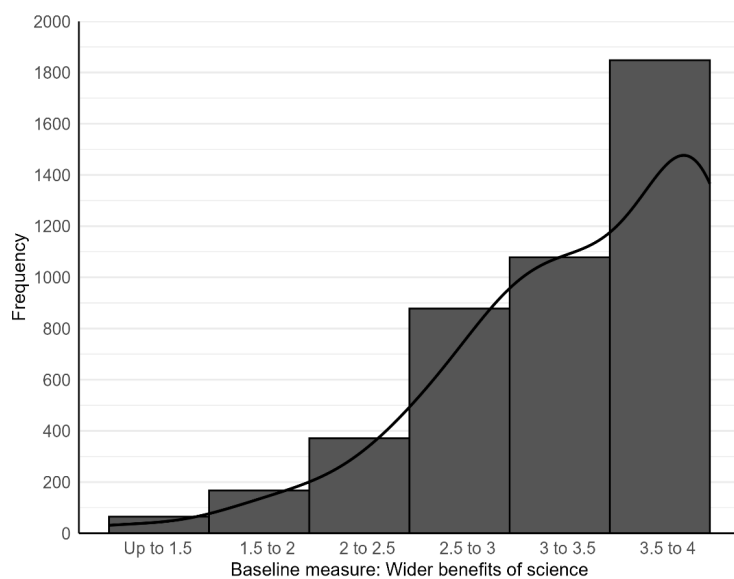
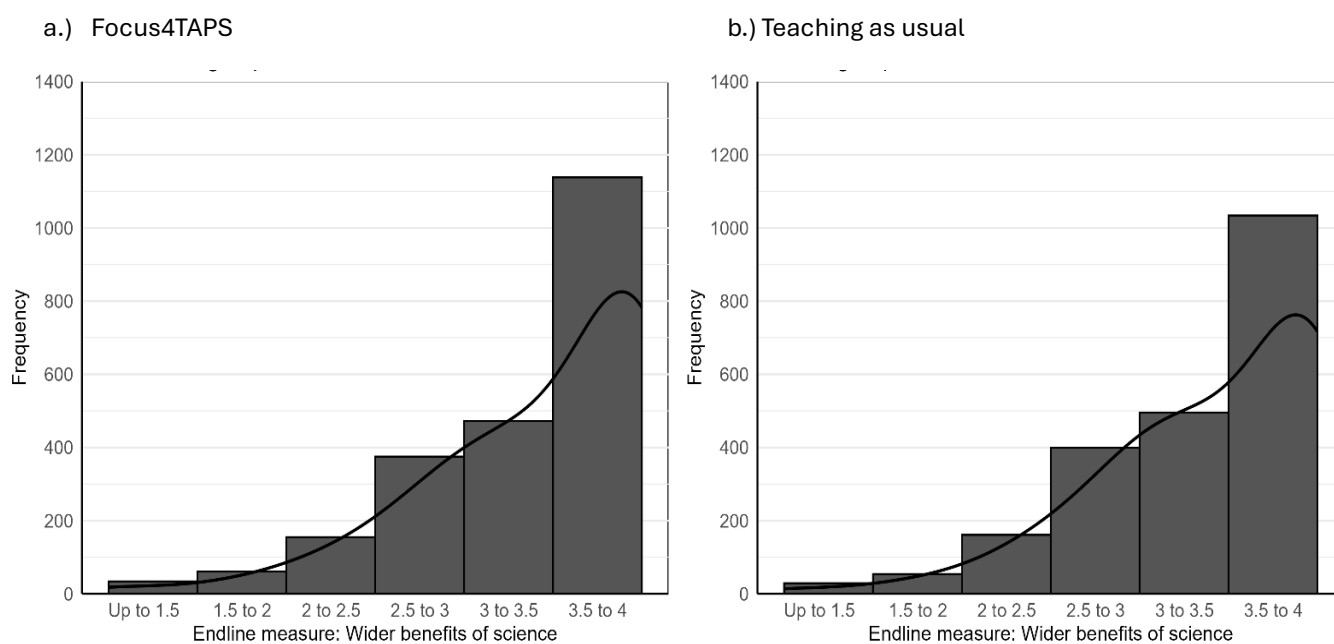


Figure 14. Distribution of wider benefits of science at endline by group



Appendix H: Science attainment test



Science Questionnaire

School Serial No.

School name

Pupil Serial No.

Pupil name

Year 5 Science Questionnaire

How to complete this questionnaire:

- This pencil  shows where you will need to put your answer.
- You may want to use a ruler for some questions.
- For some questions you may need to draw and answer instead of writing one.
- If you cannot do any of the questions, go on to the next one. You can come back to it later, if you have time.
- If you finish before the end, go back and check your work.
- Ask if you are not sure what to do.

If you have any questions, or want to find out more, you can ask any of the teachers who are present when you are filling in this assessment.

Thank you for your help!

1. Growing up

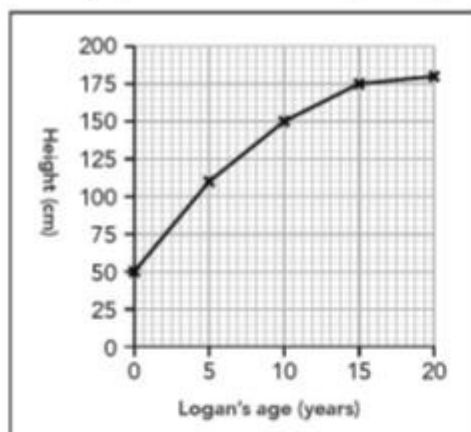
- a. Logan has collected the pictures below. They show different stages in the life of his grandmother.

Write a number from 1 to 6 in each box to put the life stages in order from youngest (1) to oldest (6)

1 MARK

b. The graph below shows how Logan has grown in height.



How tall was Logan on his fifth birthday?

\

..... cm

☐

1 MARK

c. Tick **ONE** box to show when Logan grew most quickly in height.

\

0–5 years ☐	5–10 years ☐
10–15 years ☐	15–20 years ☐

☐

1 MARK

2. Hedgehogs



Bramble bush

Hedgehog

Slug

- a. Look at the picture of the hedgehog.

Which part of the hedgehog's body helps stop foxes from eating it?

\

.....

☐
1 MARK

- b. The bush makes food material in its leaves.
The hedgehog's food includes slugs.

The two sentences above describe the same life process. Which life process?

Tick **ONE** box.

\

growth ☐	movement ☐	excretion ☐
nutrition ☐	sensing ☐	none of these ☐

☐
1 MARK

c. The hedgehog gives birth to young. This shows that it reproduces.

Which of the following shows that the bush also reproduces?

Tick **ONE** box.

New leaves grow in spring ☐	Leaf buds open in spring ☐
Leaves fall in autumn ☐	Seeds are dispersed in autumn ☐

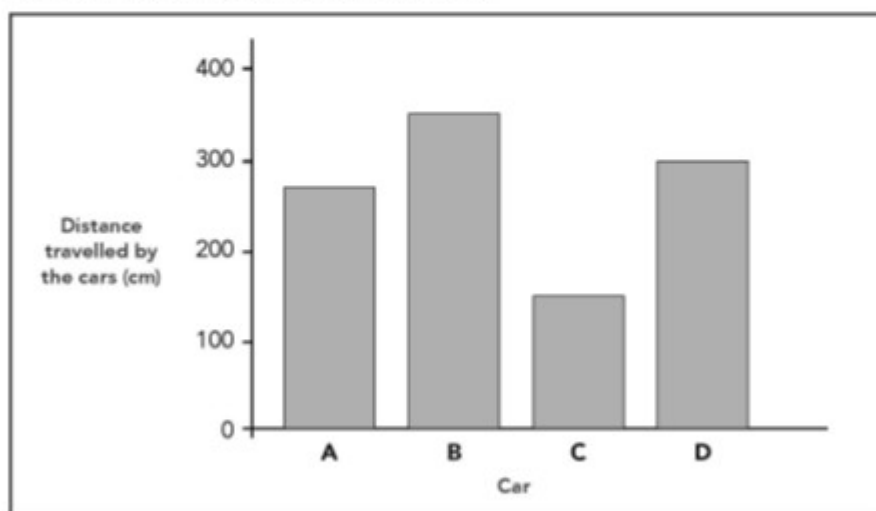
☐
1 MARK

3. Toy cars



Two children investigate the distance four different toy cars travel when they let them roll down the slope.

Freya and Yusuf record their results in a bar chart.



They discuss the results in the bar chart and write some conclusions.

Look at the results to decide whether each conclusion is **true**, **false** or you **can't tell**.

Tick **ONE** correct box for each conclusion.

\

	True	False	Can't tell
Car C went the shortest distance	☐	☐	☐
Car C was the smallest car	☐	☐	☐
Car D went furthest	☐	☐	☐

☐

1 MARK

4. Identifying solids

- a. Willow has four different solids.
Her teacher asks her to find out what the solids are.
Willow mixes a teaspoon of each solid into different beakers of water.

She records her observations in Table 1.

Table 1

Solid	Observation after mixing with water
A	Most solid floats on top of the water. The solid turns the water misty.
B	The solid cannot be seen. The liquid is clear.
C	The solid cannot be seen. The liquid is clear.
D	Some solid sinks to the bottom. The solid turns the water cloudy.

What is the name of the change that has happened to solids **B** and **C**?

\



1 MARK

- b. Willow tries to separate a mixture of solids A and D using a sieve.
Willow records her observations in Table 2.

Table 2

Solid	Observation after sieving
A	The solid stays in the sieve.
D	The solid goes through the sieve.



Sieve

Describe **ONE** difference between solids **A** and **D** that stops solid **A** going through the sieve.

\



1 MARK

- c. Next Willow puts a teaspoon of solid **B** into a beaker of vinegar.
Then she puts a teaspoon of solid **C** into another beaker of vinegar.
She records her observations in **Table 3**.

Table 3

Solid	Observation after mixing with vinegar
B	The solid cannot be seen. The liquid is clear.
C	The mixture bubbles and fizzes.

- (i) Which solid has a non-reversible change when mixed with vinegar? Tick **ONE** box.

☐ Solid B
 ☐ Solid C

- (ii) What evidence shows the change to the solid you chose is non-reversible?

.....

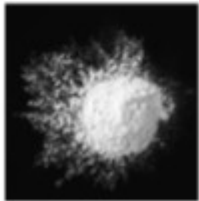
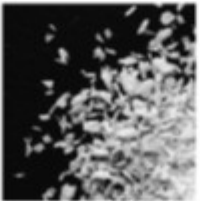
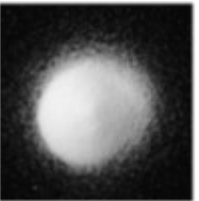
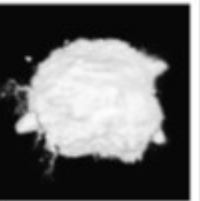
☐

1 MARK

- d. The teacher tells Willow the names of the four solids.

Draw **FOUR** lines to match each solid to its name.
Use the information in Tables 1, 2 and 3 to help you.

Solid A	Solid B	Solid C	Solid D
----------------	----------------	----------------	----------------

Name of solid Flour	Name of solid Coconut	Name of solid Salt	Name of solid Bicarbonate of soda
			

☐

2 MARKS

5. Magnetic noticeboard

a. Lily uses a magnet to hold a notice on the noticeboard in her classroom.

The board is coated in white plastic.

Tick **ONE** box to show which material may be under the plastic coating for the magnet to stick to the board.



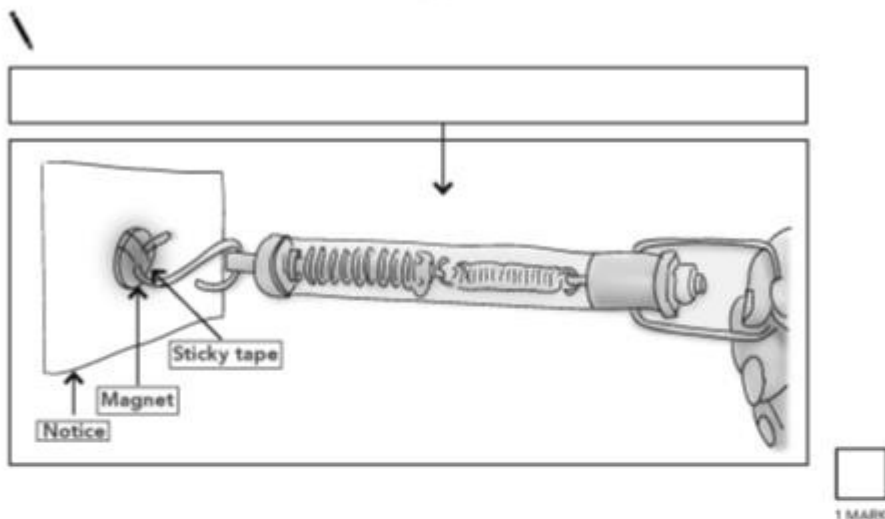
Steel ☐	Paper ☐
Wood ☐	Cork ☐

☐
1 MARK

- b. Lily has four magnets. She wants to measure how much force is needed to pull each magnet away from the board.

The picture below shows how she carries out her test.

In the box below write the name of the equipment she uses to measure the force.



- c. Lily measured the force for each magnet three times to calculate the average force.

The table below shows her results.

Magnet	Average force needed to pull the magnet away (N)
A	2
B	10
C	5
D	6

Which magnet is the strongest?

↓

.....

1 MARK

d. Lily observes that as she pulls on the magnet the force reading increases until the magnet comes away from the board.

Tick **ONE** box to show **when** Lily should take the force reading.



Before she starts pulling on the magnet ☐	Just after she starts pulling on the magnet ☐
Just before the magnet pulls away from the board ☐	After the magnet is pulled away from the board ☐

☐

1 MARK

e. Give **ONE** reason why it is better to measure the force for each magnet three times instead of just once.



.....

.....

☐

1 MARK

6. Earth and Sun

a. What shape is the Sun?

\

.....

☐

1 MARK

b. Galileo was a scientist who lived over 400 years ago. He said that the Earth stays in the same orbit as it travels around the Sun.

Write **true** or **false** next to each sentence to show what it would be like if the Earth's orbit was further away from the Sun.

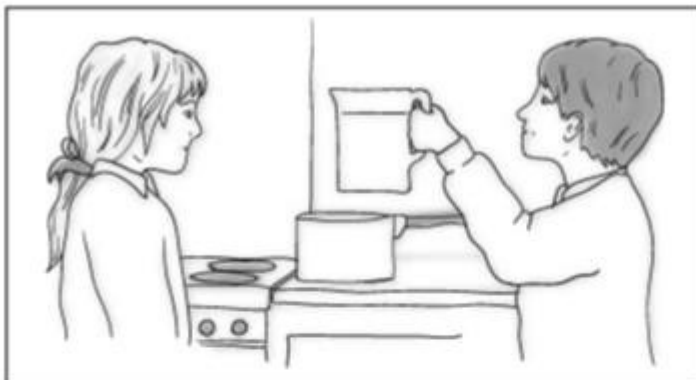
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If the Earth's orbit was further away from the Sun...	True or False?
the Earth would be colder.	
the Earth would be darker.	
the Earth would not have night-times.	
the Earth would have longer years.	

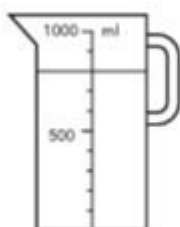
☐

2 MARKS

7. Cooking rice



a. Fatima and Lucas are cooking rice at home.



They measure some water in a jug.

How much water did they measure?

\

..... ml



1 MARK

b. They put the water into a metal saucepan.

They put the saucepan on the cooker.

Why is metal a good material for the saucepan?

Tick **ONE** box.



It is very heavy ☐	It is opaque ☐
It conducts electricity well ☐	It conducts heat well ☐

☐
1 MARK

c. After five minutes, the water starts to boil.

Lucas puts the uncooked rice into the saucepan.



The metal saucepan is hot. The wooden handle of the saucepan is still cool.

Explain why the **wood** is cool but the **metal** is hot.



.....

.....

☐
1 MARK

8. Blackbirds

a. Some children watched a video about blackbirds and their young.

They used the video to make a diary.



Tick **THREE** things **all animals** do.



Sing ☐	Grow ☐
Feed ☐	Fly ☐
Lay eggs ☐	Reproduce ☐

☐
3 MARKS

b. The children found some information about birds' eggs.

Bird	Robin	Blackbird	Crow	Raven
Egg				
Size of egg	20 x 16mm	29 x 21mm	43 x 30mm	50 x 33mm
Time taken to hatch	13 days	14 days	19 days	20 days

Describe the pattern between the size of these eggs and the time taken to hatch.

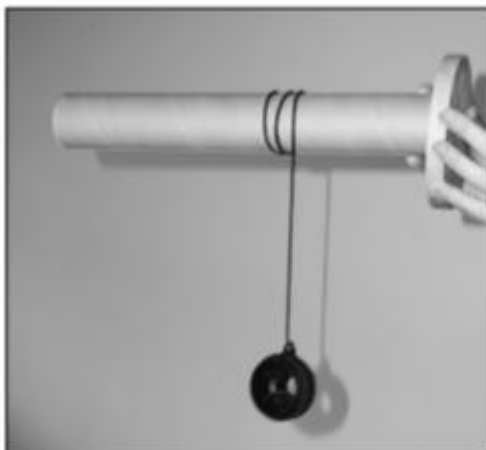
\



2 MARKS

9. Spinning cardboard roll

- a. Leo ties a weight onto some string.
He winds the string around a cardboard roll.



Leo lets go of the weight. The weight falls, the cardboard roll spins and the string unwinds. Leo records the time taken for the string to unwind.

Draw **ONE** arrow on the picture below to show the direction of the force that makes the weight fall.



☐
1 MARK

Leo repeats his test.

He slots different sized pieces of cardboard into the roll each time.



b. The larger the piece of cardboard, the more slowly it spins.



Name the force that slows down the spinning piece of cardboard.

\

.....



1 MARK

c. After the test, Leo thinks of four more questions about the spinning roll.

Tick **THREE** boxes to show which of these questions he could answer by doing more tests with the spinning roll.



Will the time to unwind be longer if the string is longer? ☐	What is the name of the force that makes the weight fall? ☐
How can I make the string unwind more slowly? ☐	What happens if I put two weights on the string? ☐

☐
1 MARK

10. At the swimming pool

- a. Ibrahim is at the swimming pool. He notices that the floor tiles around the pool have a rough surface.

Why are tiles with a rough surface safer than tiles with a smooth surface for people with wet feet?

\

.....

.....

☐
1 MARK

- b. As part of a test, Ibrahim swims across the pool wearing his clothes.

How are the forces different when he swims in his clothes compared with when he swims in his swimming costume?

Tick **TWO** boxes.

\

There is more weight ☐	There is more friction ☐
There is less weight ☐	There is less friction ☐

☐
1 MARK

11. Candle

a. When a candle is lit, some changes happen.



Some of the wax melts.

Some of the wax burns.

Are the changes in the table reversible?

Write **yes** or **no** in each row.

Change	Is the change reversible?
The wax melts	
The wax burns	

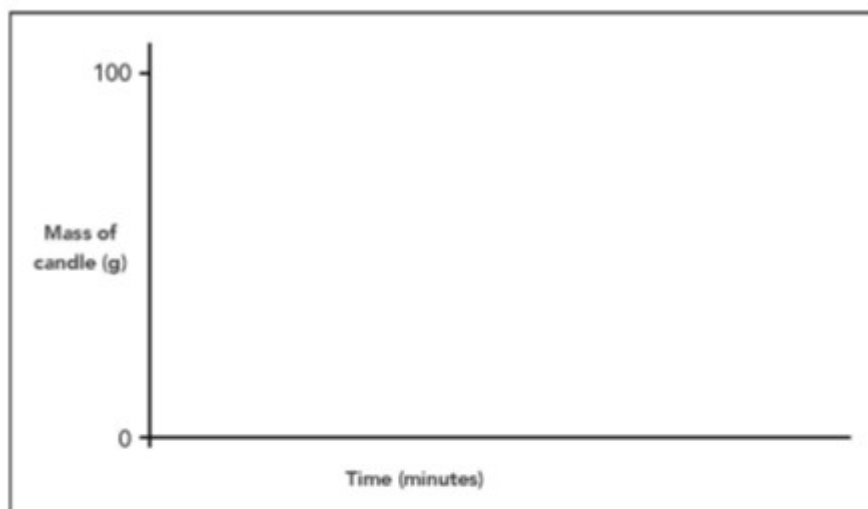
☐
1 MARK

b. Write **true** or **false** next to each statement below.

	True or False?
The wax must be heated to melt.	
When a solid melts it changes into a gas.	
Temperature shows how hot or cold something is.	

☐
1 MARK

- c. Draw a line on the graph to predict what will happen to the mass of a 100g candle when it is lit.

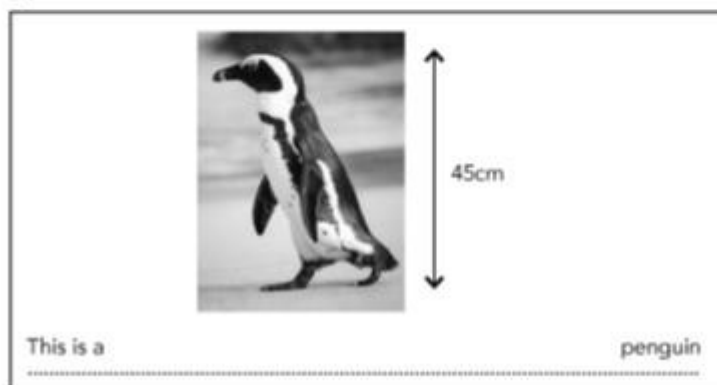


☐
1 MARK

12. Penguins

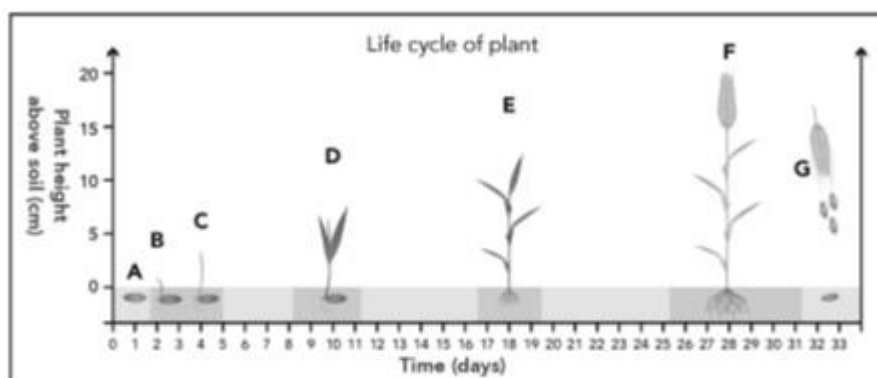
The key below can be used to identify penguins.

Use the key to identify the penguin below.



1 MARK

13. Growing plants



The diagram above shows the stages in the life cycle of the plant, labelled A to G.

Write the correct letter for each of the stages in the table.

One has been done for you.

stage	letter from diagram
Pollination	E
Fruits on plant	
Germination	
Seed dispersal	

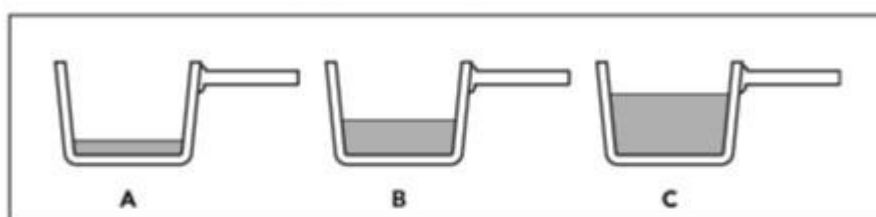
☐
3 MARKS

14. Heating water

- a. Sienna has three saucepans of water.

Sienna wants to find out how long it will take to heat each saucepan of water to 50°C. Look at the diagram.

What **variable** is Sienna changing in her investigation?



\



1 MARK

- b. Sienna times how long it takes to heat each saucepan of water to 50°C. Sienna's mum helps her to do this safely.

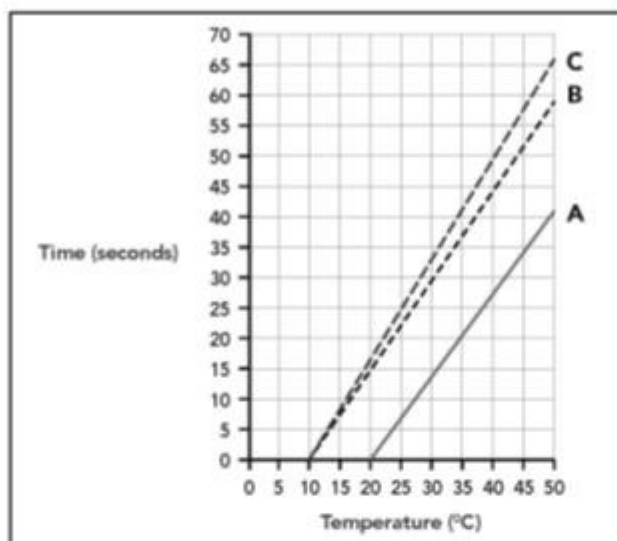
Name a piece of equipment Sienna could use to measure the temperature of the water.

\



1 MARK

c. The graph below shows how the water temperature changed in each saucepan.



When Sienna looked at the graph she realised her test was not fair.

Why was Sienna's test **not** fair? Use the graph to help you.

\

.....

.....

☐

1 MARK

d. How much time did it take the water in saucepans **A** and **B** to reach 50°C?
Use the graph to help you complete the table.

\

Saucepan	Time to reach 50°C (seconds)
A	
B	
C	66

☐

1 MARK

15. Moon trip

Astronauts travel to the Moon in a spacecraft.
Rocket engines push the spacecraft away from the Earth.

What name is given to the force that tries to pull the spacecraft back to Earth?

\

.....



1 MARK

Appendix I: Pupil questionnaire



What do you think about science?

School Serial No.

School name

Pupil Serial No.

Pupil name

What do you think about science?

The National Centre for Social Research (NatCen) are working with the Education Endowment Foundation to find out what children think about science at school.

We hope that you will complete this questionnaire to help us know more about what you think about science at school.

You don't have to take part if you don't want to.

You don't have to answer a question if you don't want to.

No-one will know whether you took part or not. The results from this research will not identify anyone.

If you have any questions, or want to find out more, you can ask any of the teachers who are present when you are filling in the survey.

How to complete this questionnaire

Please **only tick one box per question**, the one you agree with the most.

Thank you for your help!

Background

What is the date today? Day: Month: Year:

What is your first name? *Please write in capital letters with one letter in each box*

What is your surname (your family name)? *Please write in capital letters with one letter in each box*

What class are you in? *Please write in capital letters with one letter in each box*

What is your gender? *Please tick one option.*

- ☐ I am a girl
- ☐ I am a boy
- ☐ I am a gender not listed here
- ☐ Unsure how to describe myself
- ☐ Prefer not to say

Learning science

*How much do you agree or disagree with each of the following statements? **Tick one answer in each row.***

	Disagree a lot	Disagree a little	Agree a little	Agree a lot
I enjoy learning Science	☐	☐	☐	☐
I wish I did not have to study Science	☐	☐	☐	☐
Science is boring	☐	☐	☐	☐
I learn many interesting things in Science	☐	☐	☐	☐
I like Science	☐	☐	☐	☐
I look forward to learning science in School	☐	☐	☐	☐
Science teaches me how things in the world work	☐	☐	☐	☐
I like to do science experiments	☐	☐	☐	☐
Science is one of my favourite subjects	☐	☐	☐	☐

Doing well in science

*How much do you agree or disagree with each of the following statements? **Tick one answer in each row.***

	Disagree a lot	Disagree a little	Agree a little	Agree a lot
I usually do well in Science	☐	☐	☐	☐
Science is harder for me than for many of my classmates	☐	☐	☐	☐
I am just not good at science	☐	☐	☐	☐
I learn things quickly in Science	☐	☐	☐	☐
My teacher tells me I am good at science	☐	☐	☐	☐
Science is harder for me than any other subject	☐	☐	☐	☐
Science makes me confused	☐	☐	☐	☐

Science at school

	Never or almost never	Once or twice a month	Once or twice a week	Every day or almost every day
How often do you do science at school?	☐	☐	☐	☐
How often do you do investigations (practical work) in science?	☐	☐	☐	☐

*How much do you agree or disagree with each of the following statements? **Tick one answer in each row.***

	Disagree a lot	Disagree a little	Agree a little	Agree a lot
I reappraise my experiences in science so I can learn from them	☐	☐	☐	☐
I try to think about my strengths and weaknesses in science	☐	☐	☐	☐
I think about my actions in science to see whether I can improve them	☐	☐	☐	☐
I think about my past experiences in science to understand new ideas	☐	☐	☐	☐
I try to think about how I can do things better next time in science	☐	☐	☐	☐

*How much do you agree or disagree with each of the following statements? **Tick one answer in each row.***

	Disagree a lot	Disagree a little	Agree a little	Agree a lot
I know what my teacher expects me to do in science	☐	☐	☐	☐
My teacher is easy to understand when teaching science	☐	☐	☐	☐
I am interested in what my teacher says about science	☐	☐	☐	☐
My teacher gives me interesting things to do in science	☐	☐	☐	☐

My teacher has clear answers to my questions about science	☐	☐	☐	☐
My teacher is good at explaining science	☐	☐	☐	☐
My teacher lets me show what I have learned in science	☐	☐	☐	☐
My teacher does a variety of things to help us learn science	☐	☐	☐	☐
My teacher tells me how to do better when I make a mistake in science	☐	☐	☐	☐
My teacher listens to what I have to say about science	☐	☐	☐	☐
My teacher plans and discusses science lessons with us	☐	☐	☐	☐
I check my own work to find out what I have learned in science	☐	☐	☐	☐
Students check each other's work to find out what we have learned in science	☐	☐	☐	☐
My teacher explains how science is relevant to everyday life	☐	☐	☐	☐

Science in everyday life

*How much do you agree or disagree with each of the following statements? **Tick one answer in each row.***

	Disagree a lot	Disagree a little	Agree a little	Agree a lot
I would like a job that involves using science	☐	☐	☐	☐
It is important to learn about science to get ahead in the world	☐	☐	☐	☐

My parents think that it is important that I do well in science	☐	☐	☐	☐
It is important to do well in science	☐	☐	☐	☐
I like to understand how things work	☐	☐	☐	☐
I like to find the answers to questions myself	☐	☐	☐	☐
You have to be clever to do science	☐	☐	☐	☐
Science can help people make things	☐	☐	☐	☐
Science can help the environment	☐	☐	☐	☐
Science can help animals	☐	☐	☐	☐
Science can help people be healthy	☐	☐	☐	☐
Anyone can do science and be a scientist	☐	☐	☐	☐

Science investigations at school

*How much do you agree or disagree with each of the following statements? **Tick one answer in each row.***

	Disagree a lot	Disagree a little	Agree a little	Agree a lot
I can plan different science investigations	☐	☐	☐	☐
I can take measurements using different equipment	☐	☐	☐	☐
I can record and present results in tables, charts, and graphs	☐	☐	☐	☐

I can use results to make predictions for more science investigations	☐	☐	☐	☐
I can write or present explanations of results	☐	☐	☐	☐
I can understand scientific evidence and arguments	☐	☐	☐	☐
I like to do science investigations	☐	☐	☐	☐
I would like to do more science investigations	☐	☐	☐	☐

Science investigations

How much do you agree or disagree with each of the following statements? ***Tick one answer in each row.***

	Disagree a lot	Disagree a little	Agree a little	Agree a lot
Doing a science investigation is a good way to find out if something is true	☐	☐	☐	☐
Ideas in science sometimes change	☐	☐	☐	☐
Good answers are based on evidence from many different investigations	☐	☐	☐	☐
It is good to try an investigation more than once to make sure of your findings	☐	☐	☐	☐
Sometimes scientists change their minds about what is true in science	☐	☐	☐	☐
The ideas in science books sometimes change	☐	☐	☐	☐

Family and Science

	Yes	No	I don't know
My parents or carers went to university	☐	☐	☐
Someone in my family works as a scientist	☐	☐	☐
Someone in my family works in a job using science or medicine	☐	☐	☐
My parents or carers are interested in science	☐	☐	☐

Thank you for your help!

Appendix J: Boxes in each layer of the TAPS pyramid

Figure 1. Boxes in active pupils layer of the TAPS pyramid¹

ACTIVE PUPILS

Eg. Self and peer assessment

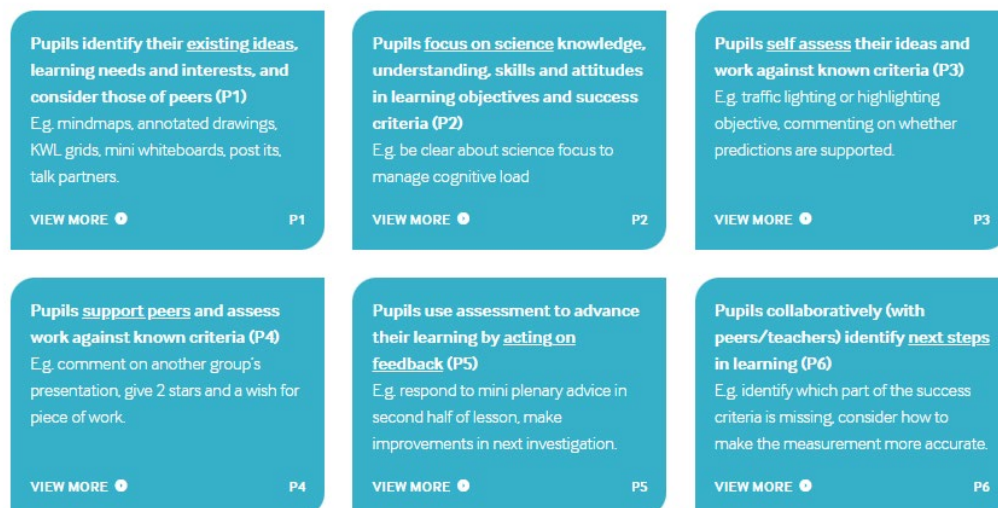
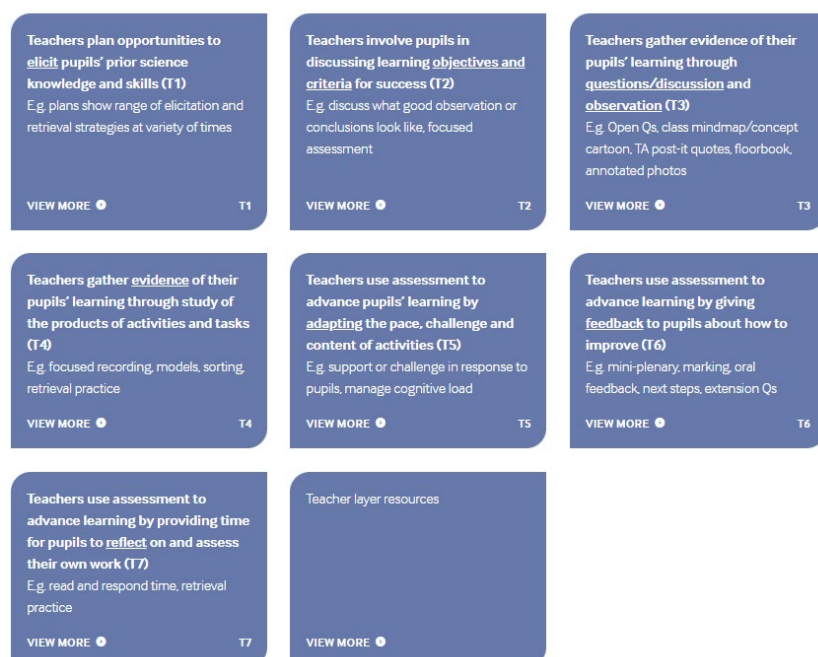


Figure 2. Boxes in responsive teaching layer of the TAPS pyramid²

RESPONSIVE TEACHING

Eg. Clear focus, questions, feedback



¹ <https://taps.pstt.org.uk/active-pupils/>

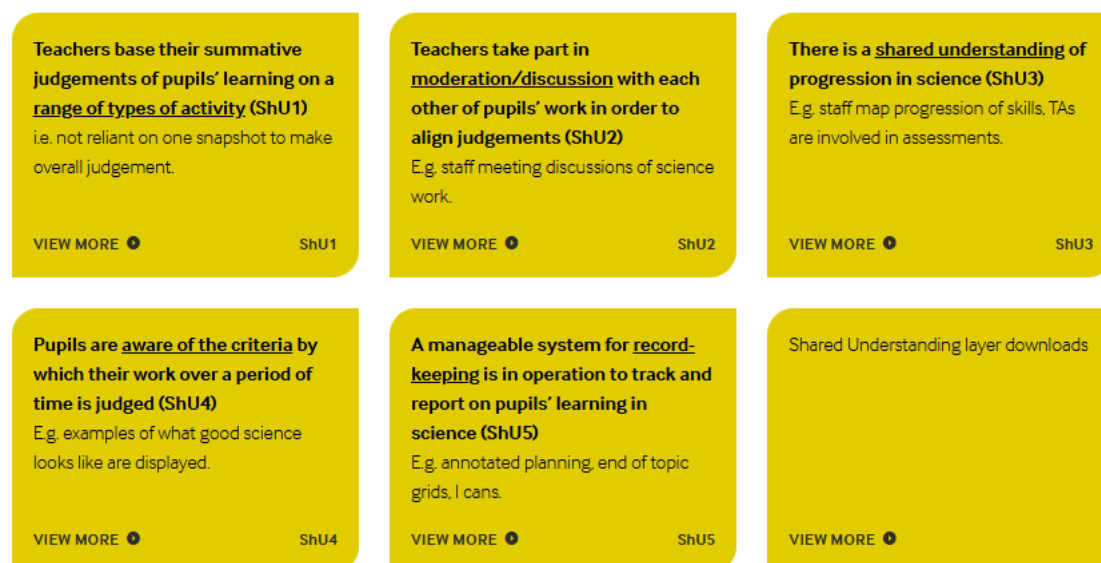
² <https://taps.pstt.org.uk/responsive-teaching/>

Figure 3. Boxes in shared understanding layer of the TAPS pyramid³



SHARED UNDERSTANDING

Balance of validity and reliability



³ <https://taps.pstt.org.uk/shared-understanding/>

Appendix K: Memorandum of Understanding



The Focus4TAPS Randomised Controlled Trial

Memorandum of Understanding

This Memorandum of Understanding (MoU) explains what your school's participation in the study will entail. If you agree to take part and accept the terms and conditions outlined, please complete a copy of this form and return by email to primary.science@bathspa.ac.uk.

Aims of the evaluation

The aim of this study is to evaluate the impact of the Focus4TAPS intervention. The Focus4TAPS programme is a one-year package of training and resources delivered by Bath Spa University (the 'delivery team'). Focus4TAPS aims to support teaching, learning, and assessment in primary science. The Focus4TAPS programme draws together research from the Teacher Assessment in Primary Science (TAPS) project, which was initially funded by the Primary Science Teaching Trust.

Structure of the evaluation

The Education Endowment Foundation (EEF) are funding an independent evaluation of Focus4TAPS by the National Centre for Social Research (NatCen: the 'evaluation team'), which will take the form of a randomised controlled trial. The trial will compare Focus4TAPS against usual science teaching in comparable primary schools.

Schools will be randomly assigned either to receive the Focus4TAPS programme (the intervention group) or to carry on as normal (the control group). The trial will focus on Year 5 pupils during the 2024-2025 school year, though recruitment and assignment to the control or intervention group will take place in the current school year (2023-2024).

Eligibility

- Schools will have pupils in Year 4 during the 2023-2024 school year who will then be in Year 5 during the 2024-2025 school year.
- Schools will not have taken part in any other recent primary science trial: such as the Thinking Doing Talking Science trial or will not be currently involved in Primary Science Quality Mark or the Focus4TAPS project.
- While your school does not have to be located in one of the following areas, you must be able to attend training in one of these areas: Newcastle, Sunderland, Sheffield, Liverpool, Bury, Nottingham, Derby, Wolverhampton, Suffolk, Essex, Southampton, South-East London, or West London.

Intervention group

The school will receive Focus4TAPS, a 3-day CPD programme for an 80% subsidised fee of £150 per school during the 2024-2025 school year. The school will also receive £200 as a 'thank you' at the end of the trial, following completion of all of the trial requirements.

The Focus4TAPS programme will work with a Year 5 teacher and science subject leader. Only one Year 5 class from each school will be included in the trial, although the teaching approach can be used with other classes who will not be involved in the evaluation activities.

The Focus4TAPS programme provides a package of training for teachers, with resources and activities to support the teaching of 'Working Scientifically' and science content. The school will receive:

- three training days for one teacher **and** one science subject lead, one per term starting from September/October 2024, provided within the school's region;
- science subject leadership guidance on how to embed Focus4TAPS across the school;
- access to a range of new and updated resources which will not be available for other schools until after the trial;
- support for Focus4TAPS lessons, to enable the practices to be embedded in the science curriculum.

Control group

The school will continue with usual teaching and learning activities in science. One Year 5 class from each school will be included in the trial. The school will receive £500 as a 'thank you' at the end of the trial, following completion of all of the trial requirements detailed below.

The school will have the opportunity to access the Focus4TAPS programme after the trial, for a reduced fee (expected to be £400 for the 3-day CPD programme; reduced from the usual fee of £750).

Evaluation activities

In order to evaluate the impact of the Focus4TAPS programme, evaluation activities will take place with pupils and teachers in **both** control and intervention groups. Parental consent will be obtained for pupils' participation, and pupils will be fully informed of the nature of their involvement and their right to withdraw.

Pupils

All pupils with parental consent in the selected Year 5 classes (*intervention and control*) will complete the following activities:

- An age-appropriate survey about their attitudes towards science and their experiences of science teaching and learning (baseline- Sep 2024, and endline - Jun 2025)
- A science test covering the Year 5 science curriculum (endline – Jun 2025)

Some pupils in the *intervention* group may also be invited to participate in a focus group, which would take place in person. This would require a separate consent form for each participant.

Teachers

Teachers involved in the evaluation will complete the following activities:

- A survey at the beginning of the intervention (Year 5 class teacher, *intervention* and *control* – Sep 2024)

- A survey at the end of the intervention (Year 5 class teacher and Science subject lead, *intervention* and *control* – Jun 2025)
- A lesson reflection (Year 5 class teacher, *intervention* – during Day 2 training)
- Short feedback questionnaires (Year 5 class teacher and Science subject lead, *intervention* – during training sessions)

Some Year 5 class teachers in the *intervention* group may also be invited to participate in

- a focus group (online)
- a lesson observation (in person)

Month	Activity
Jan – May 2024	Schools sign up to the project (first come, first served!)
Feb – June 2024	Once MoU returned, schools send an information sheet (provided) to parents and submit pupil data and KS1 results to NatCen
Jun 2024	NatCen informs schools which group (<i>intervention</i> or <i>control</i>) they will be randomly assigned to
July 2024	At least one representative from each school (e.g. Science lead, Year 5 teacher, or SLT) to attend an online introductory meeting run by BSU
Aug 2024	NatCen to inform consenting intervention schools if they have been selected to be a case study school
Sep 2024	Baseline data collection (pupil science test and teacher survey)
Sep 2024 – July 2025	Programme delivered
	Data collection from Case Study Schools (teacher focus groups, lesson observations, and pupil focus groups)
June 2025	Endline data collection (pupil science tests, pupil surveys, teacher surveys, and Science lead surveys)

Data protection

For the duration of the evaluation, NatCen is a data controller who also processes data. This means we are responsible for deciding the purpose and legal basis for processing data. The legal basis is “legitimate interest”, as a legitimate interest assessment (LIA) has been conducted. This means we believe that there is a genuine reason for us to process this data (to evaluate Focus4TAPS), the data are needed to fulfil this purpose (we could not evaluate Focus4TAPS without this information) and using the data will not interfere with individuals’ interests, rights or freedoms.

After the evaluation ends, data from the impact evaluation will be stored in the EEF archive (as detailed in the privacy notice found below). At this point, the EEF will become the data controller.

If you have any questions about the evaluation, including how personal information will be processed, please contact the NatCen research team on focus4taps@natcen.ac.uk.

All data will be treated with the strictest confidence and will be stored and processed in accordance with the General Data Protection Regulations (GDPR).

Schools will securely share information about pupils (including their name and date of birth) with NatCen so that information can be linked with the National Pupil Database (which is held by the Department for

Education and shared with the Department for Education, EEF, EEF's data contractor FFT Education, and in an anonymised form to the UK Data Archive). Once pupil information is included in the data set, the data will be anonymised and no one will be able to identify individual pupils.

NatCen will have access to information on schools, teachers, children, and parents taking part in the Focus4TAPS programme.

For children, NatCen will collect their first name, last name, gender, date of birth, Unique Pupil Number (UPN), free school meal status, year group, and class if in a multi-form-entry school. This data will be securely transferred by schools to the NatCen research team.

Schools will also provide school-level average Key Stage 1 maths and reading scores from the 2021-2022 academic year.

The delivery team, BSU, will collect details from schools and share them with NatCen through a secure server. BSU will also collect the full names and contact details of teachers as well as those of the science lead, head teacher, school finance manager, and school data manager. In signing this MoU, schools agree for BSU to share names and email addresses of staff with NatCen.

BSU will act as a data processor during recruitment. AlphaPlus Consultancy will also be a data processor for the pupil assessments and associated data in schools. This means that BSU and AlphaPlus Consultancy will be responsible for following the instructions set by the data controller and will abide by UK GDPR regulations.

The results of the trial will not identify any schools, teachers, or pupils.

Personal data will be processed so long as it is required for the research project.

More details are provided in the Privacy Notice at the end of this document. If you are concerned about how personal data is being processed, or if you would like to contact us about your pupils' data and/ or rights, please contact NatCen in the first instance at focus4taps@natcen.ac.uk.

Requirements for all schools

Setup

- Headteachers will sign a copy of this document (the Memorandum of Understanding), and schools will return the signed copy to primary.science@bathspa.ac.uk.
- Schools will select one Year 4 class who will be in Year 5 in the 2024-2025 school year to participate in the evaluation, along with their class teacher and the Science subject lead.
- Schools will deliver letters provided by Bath Spa University to parents of the selected Year 4 pupils, giving them information about the study and an opportunity to opt their child out of the data gathering process (we will provide the letters), and will inform the evaluation team of any arising opt-out responses throughout the trial.
- Schools will provide contact details of their data manager to facilitate the return of requested data to the evaluation team.
- Schools will provide the evaluation team with pupil details from the selected class (unless an opt-out form has been received): first name and surname, date of birth, gender, Unique Pupil Number (UPN), eligibility for Free School Meals, pupil's class and pupil's teacher. They will also provide school-level average Key Stage 1 maths and reading scores from the 2021-2022 academic year. This will be uploaded using the template provided by the evaluation team, via a secure project website.
- Schools will follow the guidance from the evaluation team regarding the secure transfer of data.
- Schools will consent to randomised allocation and will be randomly allocated to either the intervention group (Focus4TAPS) or the control group (teaching as usual). All schools will commit to the outcome of the randomisation process. Those allocated to the intervention group will be required to pay a £150 fee towards the training.

- At least one representative per school (e.g., Science subject lead, Year 5 teacher, or SLT), will attend an online introductory meeting in the summer of 2024 (from both intervention and control schools).

Withdrawal

- If the school has to withdraw from the project for operational or other unavoidable reasons, it will notify the evaluation team and the delivery team immediately and will still be asked to provide test data for the evaluation. In order to qualify for the payment all data needs to be collected for control and intervention schools.

Requirements for intervention group schools (data collection, CPD and intervention to take place in the academic year 2024-2025)

- Work closely with the delivery team and the evaluation team.
- Two teachers will attend the three Focus4TAPS training (CPD) days.
- Teachers will complete Focused Assessment lessons as part of their science curriculum.
- Schools will deliver Focus4TAPS materials to Year 5 pupils in the selected class.
- Schools will not share Focus4TAPS materials beyond the school.
- At the beginning of the autumn term 2024-2025, schools will facilitate Year 5 pupils in selected classes and their class teachers to complete a baseline survey.
- During the summer term of 2024-2025, schools will facilitate Year 5 pupils in selected classes to complete a follow-up survey, and to undertake a science test, both of which will be externally invigilated by AlphaPlus Consultancy.
- During the summer term of 2024-2025, schools will facilitate selected Year 5 teachers and their science subject lead to complete a follow-up survey.
- Some schools will be invited by the evaluation team to become case study schools, and will either participate in a teacher focus group, or a lesson observation followed by a pupil focus group. Case study schools who agree to be such will facilitate the evaluation team in gathering voluntary consent (via letters to parents) for pupil focus groups. Case study schools will help the evaluation team make arrangements to undertake lesson observations and focus groups with participating pupils and teachers.
- Schools must ensure to inform any members of the evaluation team who are visiting the school about the school's safeguarding processes and provide details of the school staff member whom they should contact should a safeguarding disclosure need to be made.
- Schools must ensure that members of the evaluation team are never left unsupervised with children. A member of school staff should always be present to supervise activities.

Requirements for control group schools

- Schools will work closely with the evaluation team.
- At the beginning of the autumn term 2024-2025, schools will facilitate Year 5 pupils in selected classes and their class teachers to complete a baseline survey.
- During the summer term of 2024-2025, schools will facilitate Year 5 pupils in selected classes to complete a follow-up survey, and to undertake a science test, both of which will be externally invigilated by AlphaPlus Consultancy.
- During the summer term of 2024-2025, schools will facilitate selected Year 5 teachers and their science subject lead to complete a follow-up survey.
- Schools must ensure to inform any members of the evaluation team who are visiting the school about the school's safeguarding processes and provide details of the school staff member whom they should contact should a safeguarding disclosure need to be made.
- Schools must ensure that members of the evaluation team are never left unsupervised with children. A member of school staff should always be present to supervise activities.

Responsibilities of the delivery team (Bath Spa University)

- Work closely with the evaluation team.
- Act as the first point of contact for any questions about Focus4TAPS programme.

- Provide the Focus4TAPS programme for all intervention group schools.
- Act as a data processor during the period of recruitment.
- Collect school details and details of participating teachers and lead contacts (names and email details) and share these securely with the evaluation team.
- Record attendance at the Focus4TAPS training days and details of Focused Assessment tasks submitted from teachers.
- Securely share data collected through training feedback questionnaires and reflective exercises completed during training with the evaluation team.
- Participate in an interview concerning the trial with the evaluation team.
- Submit an anonymised safeguarding incident log to EEF covering any safeguarding concerns that have come up during the course of programme delivery.

Responsibilities of the evaluation team (NatCen)

- Work closely with the delivery team.
- Act as the first point of contact for any questions about the evaluation.
- Act as the data controller until the data enters the EEF archive.
- Conduct the random allocation to intervention and control groups.
- Provide information sheets and consent forms for parents/carers (via the delivery team).
- Provide guidance to schools on how to collect and return data (pupil information, surveys and tests) safely and securely.
- Provide a template for collecting pupil data from selected classes.
- Collect pupil data including first name and surname, date of birth, gender, Unique Pupil Number (UPN), eligibility for Free School Meals, pupil's class and pupil's teacher, as well as school-level KS1 data, using secure methods.
- Request NPD data using pupil details.
- Organise baseline and follow-up pupil surveys and pupil science tests with schools and external invigilators.
- Organise surveys with teaching staff and Science subject leads.
- Invite intervention schools to be involved with case study work and undertake case study focus groups and lesson observations with pupils and teachers.
- Analyse the data from the project.
- Disseminate the research findings in collaboration with the delivery team.
- Ensure that all evaluation team members visiting the school are familiar with the school's safeguarding procedures, have DBS clearance and have received appropriate training on safeguarding protocols.
- Submit an anonymised safeguarding incident log to EEF covering any safeguarding concerns that have come up during the course of the evaluation.

The Focus4TAPS Randomised Controlled Trial

Memorandum of Understanding

This Memorandum of Understanding constitutes the school's agreement with Bath Spa University and NatCen to participate in the Focus4TAPS trial.

Head teacher agreement

I agree for my school to take part in the Focus4TAPS trial and I accept the eligibility terms and conditions.

School name	
Name of MAT (if applicable)	
School Address	
School Postcode	
School Telephone Number	
School Unique Reference Number (URN) (6 digits)	
Head teacher name	
Head teacher signature	
Head teacher email	
Date	
Science subject lead name	
Science subject lead email	
School finance name	
School finance email	
School data manager name	
School data manager email	
Year 5 class teacher selected for trial (if known): name	
Year 5 class teacher selected for trial (if known): email	

If you know your school's average results for KS1 Reading and Maths for the academic year 2021/2022, please include them here: Reading _____; Maths _____.

Please return by email to: primary.science@bathspa.ac.uk

Focus4TAPS Evaluation Privacy Notice

In line with the UK General Data Protection Regulation (GDPR), we want to inform you how information will be processed in the evaluation of Focus4TAPS. In this privacy notice, we explain, who will have access to participants' personal data, how data will be used, stored and deleted, the legal basis for data processing, and who you can contact with a query or a complaint.

Who's who?

This evaluation is being carried out by independent evaluators, the National Centre for Social Research (NatCen), commissioned by the Education Endowment Foundation (EEF). Bath Spa University (BSU) has developed and will deliver the programme.

You can find out more about NatCen at www.natcen.ac.uk.

You can find out more about the EEF at www.educationendowmentfoundation.org.

You can find out more about BSU at www.bathspa.ac.uk/schools/education/

Who will access personal data?

NatCen are carrying out this evaluation and named individuals on the NatCen research team will have access to:

- Sample files provided by schools containing School Unique Reference Numbers (for the National Pupil Database or the NPD) and the following details for selected Year 5 pupil classes:
 1. Unique Pupil Number (UPN) – for the NPD
 2. Date of birth
 3. Gender
 4. First name
 5. Last name
 6. Free School Meal (FSM) status
 7. Year group
 8. Class (if a multi-form-entry school)
- Pupil attainment data from the NPD and pupil assessment data from our impact evaluation (as detailed below)
- School-level average Key Stage 1 maths and reading scores from the 2021-2022 academic year
- School and teachers'/staff members' names and contact details provided by Bath Spa University
- Audio recordings from pupil focus groups and teacher focus groups
- Teacher and pupil survey responses
- Fieldnotes from lesson observations

BSU are delivering the programme and are responsible for recruitment. They will have access to school details and details of participating teachers and lead contacts (names and email details).

McGowan Transcriptions (www.mcgowantranscriptions.co.uk) is the transcription service NatCen use to transcribe our interview and focus group data. They will have access to recordings and transcripts from all interviews and focus groups. McGowan Transcriptions is on NatCen's approved supplier list and is compliant with all our information security policies.

Formara Print (www.formara.co.uk) is the printing company NatCen use. They will print documents containing pupil names, UPNs and dates of birth.

AlphaPlus Consultancy (<https://www.alphaplus.co.uk/>) will visit schools to invigilate pupil assessments (a science test and a combined questionnaire/survey). They will have access to pupil details only for the classes in which they will be invigilating pupil assessments.

Experienced NatCen researchers will visit schools to conduct focus groups and lesson observations. They will have access to pupil details only for the classes in which they will be conducting focus groups and lesson observations.

All invigilators and researchers visiting schools will have Enhanced DBS clearance.

How will the data be used?

The data collected will be used for research purposes only.

We will a) collect pupil assessment data and b) use attainment data from the National Pupil Database (NPD) in our **impact evaluation**. We will compare results of children who do and do not take part in Focus4TAPS, to see whether the programme makes a difference to how well they do in maths and science. All assessment and attainment data will be pseudonymised before being analysed.

For the pupil assessments, pupils will complete:

- a science attainment assessment (developed by the University of York for the EEF)
- a questionnaire about pupils' beliefs and attitudes to science (developed by Mutjaba et al., 2022, for a previous evaluation of Focus4TAPS)

The **impact evaluation** questionnaire will have additional survey questions at the end about pupils' experiences of learning science that will be used in our **process evaluation**. Information and opinions gathered from these additional survey questions, pupil focus groups, teacher focus groups, lesson observations, and teacher surveys will be used in our **process evaluation** to understand how the programme works in practice and what children and schools think of it. Only schools selected to be Case Study schools will participate in either the teacher focus groups, or the pupil lesson observations followed by pupil focus groups. All responses will be pseudonymised before being analysed.

All impact evaluation and process evaluation data will be treated with the strictest confidence – no schools, teachers, staff members or pupils will be identified in any report arising from the research.

NatCen will securely delete personal information about participants no more than one year after the evaluation is finished (by December 2026 at the latest).

Assessment results will be linked with information about the pupils from the National Pupil Database (NPD). At the end of the evaluation, the pseudonymised data will be shared with the Department for Education, and with the Office for National Statistics, the EEF and the EEF's archive manager and potentially other research teams. For the purposes of research and archiving it will also be stored in the EEF archive (managed by FFT Education) where other research teams can access it. The archive does not contain direct identifiers like pupil names, contact details and date of birth, but does hold a Pupil Matching Reference (PMR). The PMR is used for further matching to the NPD and other administrative datasets that may be required as part of subsequent research.

The legal basis for processing data

For the duration of the evaluation, NatCen is a data controller who also processes data. This means we are responsible for deciding the purpose and legal basis for processing data. In order for the use of personal data to be lawful, we need to meet one (or more) conditions in the data protection legislation, as set out in

Article 6(1) of the General Data Protection Regulation (GDPR). For the purpose of this project, the relevant condition that we are meeting is 'legitimate interest'. This means we believe that there is a genuine reason for us to process this data (to evaluate Focus4TAPS), the data are needed to fulfil this purpose (we could not evaluate Focus4TAPS without this information) and using the data will not interfere with individuals' interests, rights or freedoms.

BSU will be a data processor during recruitment, and AlphaPlus Consultancy will be a data processor for the pupil assessments. This means that they are responsible for following the instructions set by the data controller and abiding by UK GDPR regulations.

After the evaluation ends, data from the impact evaluation will be stored in the EEF archive (as detailed above). At this point, the EEF will become the data controller. You can find the EEF data archive privacy notice [here](#).

Who can I contact with a query or a complaint?

You have the right to raise any concerns with the Information Commissioner's Office (ICO) via their website at <https://ico.org.uk/concerns/>.

Contact information

If you have any questions about the evaluation, including how personal information will be processed, please contact the NatCen research team at focus4taps@natcen.ac.uk.

Appendix L: School information letter



The Focus4TAPS Evaluation

This study is a collaboration between the Education Endowment Foundation (EEF), the National Centre for Social Research (NatCen), and Bath Spa University.

Summary

- We invite primary schools to take part in an evaluation of a programme aiming to improve science attainment for pupils in primary schools by improving teaching approaches and assessment in science.
- The programme has shown positive results in a previous study: improvements in science (+2 months of progress).
- Focus4TAPS consists of teachers attending 3 CPD training days, who will then be given access to Focus4TAPS resources, and will be required to implement a minimum of 5 Focused Assessment lessons across the school year. These Focused Assessment lessons can be easily integrated into regular science teaching as they aim to support the teaching of 'Working Scientifically' and the delivery of science content within the Year 5 curriculum. Teachers are thus encouraged to use the information and resources from the training in their own lessons and teaching.
- This study will run between Autumn 2024 and Summer 2025 and will involve one Year 5 class per school.
- Only schools randomly assigned to the intervention group will receive training and resources and be required to implement the Focused Assessment lessons.

What?

- Focus4TAPS was developed by Bath Spa University, drawing on research from the Teacher Assessment in Primary Science (TAPS) project. It provides training for teachers to implement Focused Assessment lessons within the classroom, with resources and activities to support the teaching of 'Working Scientifically'.
- Lessons follow a Focused Assessment approach, where teachers use assessment for learning in their classrooms, such as focusing on assessing practical inquiry tasks to develop pupils' scientific reasoning skills and using self and peer-assessment to develop pupils' metacognitive skills.
- Focus4TAPS involves 3 CPD training days for teachers assigned to the intervention group, and the implementation of 5 Focused Assessment lessons in total across the entire 2024-2025 school year.

How?

In this study, we will test the impact of Focus4TAPS on science attainment in **Year 5** using a randomised controlled trial. The evaluation will compare Focus4TAPS against usual science teaching in comparable primary schools. Schools will be randomly assigned **either** to receive the Focus4TAPS programme (the *intervention* group) or to continue teaching as usual (the *control* group). The evaluation will focus on Year 5 pupils during the 2024-2025 school year, though recruitment and assignment to the control or intervention group will take place in the current school year (2023-2024). Randomised controlled trials are considered the strongest type of evaluation to work out if a programme is having an impact.

When?

Sign up between January - May 2024. The number of school places is limited so sign up today! The evaluation will begin in September 2024.

Where?

While your school does not have to be located in one of the following areas, you must be able to attend training in one of these areas: Newcastle, Sunderland, Sheffield, Liverpool, Bury, Nottingham, Derby, Wolverhampton, Suffolk, Essex, Southampton, South-East London, or West London.

What will it cost my school?

Schools randomly assigned to the *intervention* group will receive Focus4TAPS, a 3-day CPD programme for a fee of £150 per school during the 2024-2025 school year. The school will also receive £200 as a 'thank you' at the end of the trial, following completion of all the trial requirements.

Schools randomly assigned to the *control* group will continue with usual teaching and learning activities in science. The school will receive £500 as a 'thank you' at the end of the trial, following completion of all the trial requirements. The school will also have the opportunity to access the Focus4TAPS programme after the trial, for a reduced fee.

What activities will be involved?

In order to evaluate the impact of the Focus4TAPS programme, evaluation activities will take place with pupils and teachers in both *intervention* and *control* groups. Parental consent will be obtained for pupils' participation, and pupils will be fully informed of the nature of their involvement and their right to withdraw.

Pupils

All pupils with parental consent in the selected Year 5 classes (*intervention and control*) will be asked to complete an age-appropriate survey about their attitudes towards science and their experiences of science teaching and learning at the beginning and end of the programme. They will also be asked to complete a science test covering the Year 5 science curriculum at the end of the programme. Some pupils in the *intervention* group may also be invited to participate in a focus group, which would take place in person.

Teachers

Teachers involved in the evaluation (*intervention and control*) will be asked to complete surveys at the beginning and end of the programme. Teachers in the *intervention* group will also be asked to complete some short activities as part of the training provided. Some teachers in the *intervention* group may also be invited to participate in a focus group (online) **or** a lesson observation (in person).

How will data sharing work?

Participating schools will be asked to send out an information sheet and opt-out consent form to parents of current Year 4 pupils, who will be in the selected Year 5 class in the 2024-2025 school year. Any pupils who are opted out may still participate in the Focus4TAPS programme but will not provide any data for the evaluation.

For pupils who are not opted out from data collection, schools will share the following pupil data: first name and surname, date of birth, gender, Unique Pupil Number (UPN), free school meal status, pupil's class, and pupil's teacher. Schools will also provide school-level average Key Stage 1 maths and reading scores from the 2021-2022 academic year. This will be uploaded using the template provided by the evaluation team, via a secure project website.

These data will be used to link information from the National Pupil Database (NPD) to evaluation outcomes. At the end of the evaluation, the data will be shared with Bath Spa University, the Department for Education, FFT

Education (EEF's data processor for their archive), and the Office for National Statistics. Data may also be shared in an anonymised form with other research terms in the future. All EEF trial data is stored in the EEF data archive. The archive does not contain direct identifiers like pupil name, contact details and date of birth, but does hold a Pupil Matching Reference (PMR). The PMR is used for further matching to the NPD and other administrative datasets that may be required as part of subsequent research. We will not use pupil names or school names in any report arising from this research.

All pupil information collected as part of the study will be treated with the strictest confidence by the project team in line with the requirements of the GDPR and the Data Protection Act 2018. You can find further information about data collection, sharing and storing in the Privacy Notice attached to the Memorandum of Understanding.

Project team

This is a major study and several different organisations are collaborating on it. They are:

- **The National Centre for Social Research (NatCen)** - *Responsible for evaluating the programme.* NatCen is Britain's largest and oldest social research organisation. They have delivered several school-based studies for charities and the government about what works in education, and are experts at research that involves pupils, young people and teachers.
- **Bath Spa University (BSU)** – *Responsible for developing the programme, recruitment for the evaluation, and development and delivery of the training.* Bath Spa University is the largest Initial Teacher Education provider in the South West, working with over 600 school partners. It is the home of Focus4TAPS and currently the Sunday Times University of the Year for Social Inclusion.
- **Education Endowment Foundation (EEF)** – *Responsible for funding the study and overall management of programme delivery and evaluation.* The EEF is an independent charity dedicated to breaking the link between family income and educational achievement. They run projects to test the effectiveness of education programmes to improve outcomes for children across the UK.

Key dates/timeline

Month	Activity
Jan – May 2024	Schools sign up to the project (first come, first served!)
Jan – June 2024	Schools send the information sheet to parents and submit pupil data and KS1 results to NatCen
Jun 2024	NatCen informs schools which group (<i>intervention</i> or <i>control</i>) they will be randomly assigned to
July 2024	At least one representative from each school (e.g. Science lead, Year 5 teacher, or SLT) to attend an online introductory meeting run by BSU
Aug 2024	NatCen to inform consenting intervention schools if they have been selected to be a case study school
Sep 2024	Baseline data collection (pupil science test and teacher survey)
Sep 2024 – July 2025	Programme delivered
	Data collection from Case Study Schools (teacher focus groups, lesson observations, and pupil focus groups)

June 2025	Endline data collection (pupil science tests, pupil surveys, teacher surveys, and Science lead surveys)
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Next steps

We have limited spots for this project. If you are interested in participating, please sign up using the following link: <https://forms.office.com/e/EVK1XeYNfH>

If you have questions, please email primary.science@bathspa.ac.uk for information about the Focus4TAPS programme and focus4taps@natcen.ac.uk for information about the evaluation. We look forward to hearing from you soon!

Appendix L: Parent information letter and opt-out form



The Focus4TAPS Programme

Information sheet for parents/carers

Dear parent/carers,

Over the coming school year, your school is taking part in a research project called '*Focus for Teacher Assessment in Primary Science*' (*Focus4TAPS*). This letter contains information about the project and what it means for your child. Please read it carefully.

What is Focus4TAPS?

- Focus4TAPS is a programme that provides training and resources for teachers to improve their teaching and assessment of science in primary schools.
- Focus4TAPS aims to support the teaching of a key part of the science curriculum, known as 'Working Scientifically'.
- Focus4TAPS lessons will be delivered by teachers throughout the 2024-2025 school year.
- In [previous research](#), Focus4TAPS was found to increase pupils' attainment in science (+2 months of progress).

Who is running the study?

This is a major study and several different organisations are collaborating on it. They are:

- **The National Centre for Social Research ([NatCen](#))** - *Responsible for evaluating the programme.* NatCen is Britain's largest and oldest social research organisation. They have delivered several school-based studies for charities and the government about what works in education, and are experts at research that involves pupils, young people and teachers.
- **Bath Spa University ([BSU](#))** – *Responsible for developing the programme, recruitment for the evaluation, and development and delivery of the training.* Bath Spa University is the largest Initial Teacher Education provider in the South West, working with over 600 school partners. It is the home of Focus4TAPS and currently the Sunday Times University of the Year for Social Inclusion.
- **Education Endowment Foundation ([EEF](#))** – *Responsible for funding the study and overall management of programme delivery and evaluation.* The EEF is an independent charity dedicated to breaking the link between family income and educational achievement. They run projects to test the effectiveness of education programmes to improve outcomes for children across the UK.

How the study will work

- It will run between Autumn 2024 and Summer 2025.
- The project involves one Year 5 class per school. Some schools will be randomly selected to receive the programme while others will continue teaching science as usual
- To understand if the programme is effective, pupils in a selected Year 5 class will complete a short, age-appropriate survey about their attitudes towards science and their experiences of science teaching and learning in September 2024 and again in June 2025. Pupils will also complete a science test covering the Year 5 science curriculum in June 2025.

- Some pupils taking part in the study might also be invited to a focus group to understand what they think of the programme. You would be contacted separately to provide consent for this closer to the time.

Your child's data

- To run the programme, your school will be required to securely share information about pupils taking part in the study (e.g. name, gender, date of birth, and whether pupils receive free school meals) with NatCen who will conduct analysis to find out if the programme was effective. Schools will also provide school-level average Key Stage 1 maths and reading scores from the 2021-2022 academic year.
- Please read the [Privacy Notice](#) for full details.
- We take data security very seriously, and the study will comply fully with the General Data Protection Regulation (GDPR) and the Data Protection Act 2018.
- A report about the study will be published in early 2026. No individual pupil or school will be identifiable in this report - all details will be fully anonymised.
- If you have any questions about your school sharing data with the organisations running the study, please contact your school's data manager.

How can I withdraw my child from this study?

If you are happy for your child to participate, **you do not need to do anything** but please keep this form for your information.

If you **DO NOT** want your child's information to be used in the research, please tick the box on the next page, sign and return the attached form to your school by 2 weeks after receiving this form. They may still be taught using the Focus4TAPS resources and activities, but they will NOT have to take any tests and their information will NOT be used in the study results.

Some schools will also be invited to participate in classroom observations. Opting out now does NOT include opting out of any classroom observations, however, the focus of the classroom observations will not be on your child but instead on the delivery of the Focus4TAPS programme.

If you have any questions about the study, please contact:

- focus4taps@natcen.ac.uk for questions about the evaluation, the way we will use data, or if you decide at any time that you don't want your child's data to be used.
- primary.science@bathspa.ac.uk for questions about the Focus4TAPS programme or how it will work in your child's school.

Tick the box below and fill in the details to confirm you DO NOT want to participate in this project.

☐

Tick here

Signature: _____

Name: _____

Name of your child: _____

School Name: _____

Date: _____

Appendix M: Practical activities observed in the teacher training workshops

Table 1. Practical activities delivered in each teacher training workshop

	Practical activities delivered
First workshop	Biscuit dunking Rocket mice Card sort: solids, liquids, and gases Carousel: Focused Assessment lessons focusing on Plan, Do, or Review
Second workshop	Card sort: assessment strategies Investigating shadows Using classification keys Modelling the sun and Earth Card sort: types of enquiry Carousel: types of enquiry
Third workshop	Sugar cubes Digestive system drawings Handspans Carousel: supporting progression through using similar investigations



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