

The feasibility of using whole-class feedback to address common pupil misconceptions (Physics) – a retrospective analysis

A study comparing rates of academic progress for a concurrent Year 11 GCSE Physics groups who were subjected to traditional written feedback during the 2018/19 academic year (pre-test) and an alternative feedback method utilising whole-class verbal feedback during the 2019/20 academic year

Charlotte Wardle & Pete Hedley

PURPOSE OF RESEARCH

A workload survey of teaching staff at Richmond School, conducted in June 2019, concluded that the marking of pupils' work was a major factor in contributing towards teacher workload. Additional investigations revealed that the length of time required to provide detailed, informative and individual written feedback to pupils, coinciding with the frequency of data collection, was a common and significant factor in staff workload.

Prior to the survey, a preliminary lesson study investigation into the use of common whole-class feedback methods to reduce the necessity of written feedback was undertaken. Findings were positive and led to the formal introduction of a whole-class feedback form to staff in September 2019. The study investigates the impact of whole-class feedback upon pupil progress and staff workload.

THE RESEARCH DESIGN

A retrospective (case controlled) quantitative analysis was used, in the order to explore the effect of replacing traditional detailed written feedback with a whole-class verbal model to support the progress of pupils of different levels of prior attainment.

Pupils in this academic year had their progress rate compared to a similar time period last year. Three separate levels of pupil progress are also reported on:

- Higher prior attaining pupils
- Middle prior attaining pupils
- Lower prior attaining pupils

Figure 1: Research Design



Dependent variables

The following measures were used:

- DV1 (attainment)** – Pupil attainment on assessments conducted after the study period.
- DV2 (teacher time)** – The length of time required to mark both the control group's assessments and the intervention group's assessments.

The design allowed for the testing of the following hypotheses:

- H1 – Pupil attainment will not be negatively affected by reducing written feedback.
- H2 – Teachers spend less time providing feedback to students when using a whole-class method.

METHODS

Participants and sample size

Four mid-to-higher setted Y11 GCSE Physics classes (two retrospectively from 2018/19, two concurrently from 2019/20) took part in the research. The total sample size was 109. Lasting for a term (14 weeks; equating to around 30x 1hr lessons), controlling for pupil prior attainment with case-matching allowed for analysis of the impact of whole-class feedback for all abilities within exam-class teaching.

Procedures

All students were taught by their own teacher and undertook classwork tasks relevant to the scheme of work (GCSE course content formatively assessed through lab-book questions). Both groups received the same input (in terms of lesson content and practice exam questions).


The formative lab-book questions were marked and fed-back to students in two different ways – the control groups (2018/19) had been provided with traditional written feedback, whilst the intervention groups (2019/20) were provided with coded verbal feedback linked to the school's new whole-class feedback model. All classes were then subjected the same summative assessment.

Materials (and apparatus)

Assessment data from a prior data collection period in summer was used for the pre-tests.

The whole-class feedback form detailed below was applied to the 2019/20 intervention groups. The teacher involved measured the time it took to mark the questions involved (per capita) using this method and also the traditional written method. In addition, we used pupil voice to ascertain opinions on the impact of whole-class feedback on their perceived learning.

A summative assessment (based on the content and exam technique learned during the trial period) was then used with all groups to measure pupil progress over the course of the 14 weeks by contrasting attainment scores with those from the pre-test.



Richmond School
& Sixth Form College

“Being the best we can be”

Whole class feedback and intervention sheet

Date of feedback:28/10/19

Class:SA4

Task:Required practical 2 Thermal insulation

Strengths

1. Well drawn line of best fit
2. Good scale
3. Well labelled graph

Areas for improvement

A. Lines of best fit should be smooth not dot to dot
B. Don't forget a Key
C. Try and fill the page
D. Do you think your results here are correct?
E. Can you talk about anomalous results?
F. Can you add other control variables
G. Lines of best fit should be a single thin line

Misconceptions

*Axis do not need to start from "0"
*Scale is not correct
E The material with the lowest thermal conductivity is the material that conducts least heat.
% Make sure you add axis labels

Spelling, punctuation, grammar and presentation – common errors

InsulationVariable

Star Performers

Ethan
Kieran
Lydia

See me! - praise and specific help

Figure 2:
Whole-class feedback form

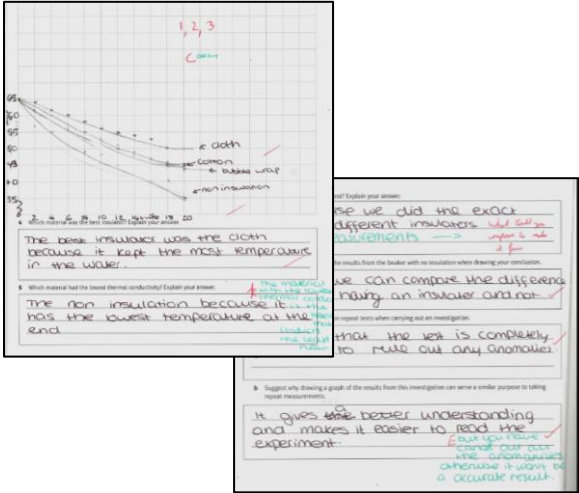
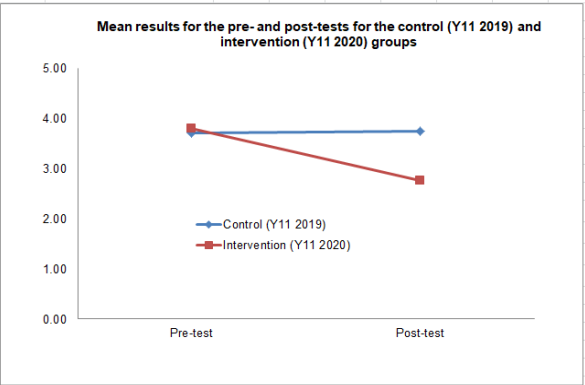


Figure 3:
Exam question marked using whole-class method

RESULTS

The Physics teacher involved reported a positive impact on workload through the use of the whole-class feedback form. . . “yes, the use of whole-class feedback saves me LOTS [of time]! Especially with the lab books as the students tend to make the same mistakes, so it saves you have to write the same comment multiple times in multiple books. I find that normally after about 5 books I have written the codes for the rest of the class. I would say it halves the time taken to mark my lab books.”

Gain scores were analysed. A two-tailed Wilcoxon signed-ranks test indicated that the application of whole-class feedback had a significant ($p < 0.001$) negative effect on Y11 pupil progress in 2020 compared to the controlled condition applied in 2019 ($r = -0.488$, CI (95%) = -0.971 - -0.005) [$d = -1.109$].



	Low PA mean progress	Middle PA mean progress	High PA mean progress
2018/19 control (written feedback)	-0.07 GCSE grades	+0.05 GCSE grades	+0.15 GCSE grades
2019/20 intervention (whole-class feedback)	-0.66 GCSE grades	-0.98 GCSE grades	-1.14 GCSE grades

LIMITATIONS

The pre-test relies on historical data obtained before staff started working on assessment validity - hence most recent data might show negative progress but is in fact more trustworthy. Findings are based on just 14 weeks worth of learning – this presents issues with reliability. We should ideally base this investigation over the course of a year and involve final summative scores on external exams.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Whole-class feedback is clearly something which reduces the workload of teaching staff who have multiple teaching groups within a cohort sitting the same assessment. It clearly allows the teacher to save time by collating recognition of common errors and ways for students to address these. However, due to the limitations detailed above, the study must be considered a work in progress whilst ongoing developments to assessment validity take place. Further analysis will now be conducted in order to assess the apparent negative effect above and whether these are accurate or due to the unreliability of the assessment process.

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