Teleprism Research Briefing

Students subject preferences and teaching styles

The Project

The aim of the "Teaching and Learning Practices in Secondary Mathematics" (Teleprism) project, funded by the Economic and Social Research Council (ESRC grant RES-061-25-0538) and based at The University of Manchester, is to map secondary students' learning outcomes, attitudes and choices regarding mathematics, together with the teaching they are exposed to.

The research team worked during the academic years 2011-2012 and 2012-2013 with 40 secondary schools in England to collect longitudinal data from students and their mathematics teachers, through short on-line (or paper) questionnaires. Case studies were also taking place at the same time involving lesson observations and interviews with teachers and students. For this briefing we report on some results from the students' surveys. Table 1 shows the sample description at each of the three survey data points (DPs), by year group.

Table 1 –Student sample size at each survey data point, by Year group

Year group cohort	Data Point 1 Start of academic year 2011-2012	Data Point 2 End of academic year 2011-2012	Data Point 3 Start of academic year 2012-2013
7	3974	2679	2510 (Year 8)
8	3073	2000	1667 (Year 9)
9	2733	1823	1527 (Year 10)
10	2157	1562	1355 (Year 11)
11	1837	773	144 (Year 12)
Total	**13774**	**8837**	**7203**

Students' favorite and less favorite topics

We asked the students to report their favorite and less favorite subjects at school. Students' response to this questions are summarised here, in particular students' top 20 favourite and least favourite subjects. The 'word clouds' below (Figure 1) were created using Tagxedo (http://www.tagxedo.com) and show the 20 most favourite and least favourite subjects of these students in all participating Year groups from 7 to 11. The font size indicates the order of preference and their relative frequencies. The actual frequencies reported for each of these subjects as either favourite or least favourite are shown below in Tables 2 and 3.

Table 2 -Favourite subjects across the data points

DP1	Count
PE	2299
Art	1255
Maths	509
English	494
Drama	458
Science	377
Music	290
History	289
ICT	276
Tech.	153
Food Tech.	146
Design Tech.	119
Geography	117
Performing Arts	82
RS	78
Media Studies	74
Biology	70
Chemistry	67
Textiles	53
HSC	50

DP2	Count
PE	2436
Art	1287
English	580
Maths	553
Science	497
Drama	473
History	337
Music	323
ICT	314
Design Tech.	202
Tech.	187
Geography	182
Food Tech.	140
RS	81
Chemistry	76
Textiles	76
Biology	69
Media Studies	66
Business Studies	62
French	58

DP3	Count
PE	2299
Art	1255
Maths	509
English	494
Drama	458
Science	377
Music	290
History	289
ICT	276
Tech.	153
Food Tech.	146
Design Tech.	119
Geography	117
Performing Arts	82
RS	78
Media Studies	74
Biology	70
Chemistry	67
Textiles	53
HSC	50

Table 3 - Least favourite subjects across the data points

DP1	Count
Maths	2397
English	1544
RS	1464
Science	1208
French	1157
Geography	1012
History	831
PE	567
Art	370
ICT	363
Music	294
PSCHE	198
Physics	197
German	175
Drama	170
Citizenship	159
Spanish	151
Humanities	131
MFL	97
Chemistry	95

DP2	Count
Maths	1420
RS	927
English	838
Science	780
French	765
Geography	644
History	577
PE	402
Art	266
ICT	236
Physics	224
Music	219
German	178
Spanish	153
Drama	148
PSCHE	107
Chemistry	93
Technology	73
Biology	58
French	58

DP3	Count
Maths	1250
English	911
RS	804
Science	726
French	698
Geography	593
History	532
PE	327
Art	229
ICT	227
Physics	204
Music	158
German	151
Drama	131
Spanish	99
Chemistry	95
Biology	62
MFL	58
Technology	50
HSC	50

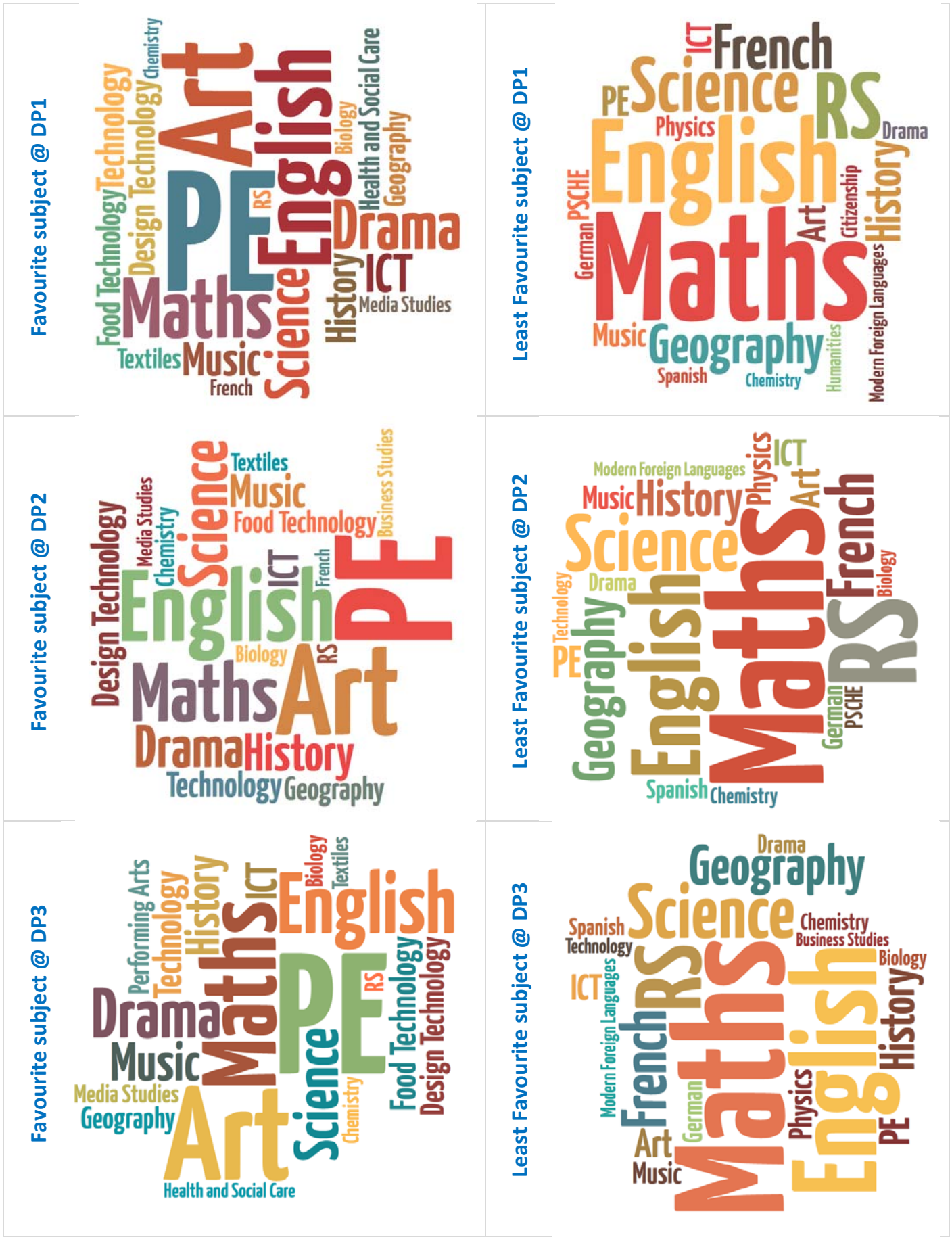

Figure 1 - Favourite (left) and least favourite subjects (right) across the data points

Students' perceptions of teaching practices

As part of the surveys, students were also asked about different activities that may or may not be taking place in their mathematics classes. Figure 2 lists these activities in order of frequency:

Item name	Frequency bars
The teacher asks us questions.	
The teacher tells us which questions/activities to do.	
The teacher asks us to explain how we get our answers.	
We listen to the teacher talk about the topic.	
The teacher expects us to remember important ideas learnt in the past.	
We copy the teacher's notes from the board.	
The teacher gives us problems to investigate.	
The teacher asks us what we already know about a lesson topic.	
We discuss ideas with the whole classroom.	
The teacher uses the computer to teach some topics.	
We talk with other students about how to solve problems.	
We work through exercises from the textbook.	
We use calculators.	
We ask other students to explain their ideas.	
We explain our work to the whole class.	
The teacher tells us to work more quickly.	
The teacher tells us what value the lesson topic has for future use.	
We work together in groups on projects.	
What we learn is related with our out-of-school life.	
We learn that mathematics is about inventing rules.	
We get assignments to research topics on our own.	
The teacher starts new topics with problems about the world.	
We use computers.	
We do projects (assignments) that include other school subjects.	
We learn how mathematics has changed over time.	
We use other things like newspapers, magazines, or video.	

Figure 2 - Frequency bars of different teaching practices happening during maths lessons (at DP1)

Based on the information given by the students, and with the help of the Rasch model of measurement, we have been able to construct two measures of students' perceptions of the teaching they receive at their maths lessons:

- **Teaching Variation**: the higher the score on this measure the more diverse the maths lessons from students' perspective.
- **Transmissionist teaching**: the higher the score the more 'traditional' or teacher-centred the practices as reported by the students.

Association of Mathematics preference and perceptions of teaching practices

Central to our study is the association between teaching practices and students' maths attitudes and dispositions. As a proxy of this relationship we present here how the two measures of students' perceptions of teaching are related to the students reported preferences of mathematics. Students were categorised based either in the Favourite group (if they reported maths as their preferred subject), in the Least favourite group (if maths was reported as their least favourite) or in the Indifferent (if they did not mention maths). The means and confidence intervals of the two measures per student category are shown for each of the three data points.

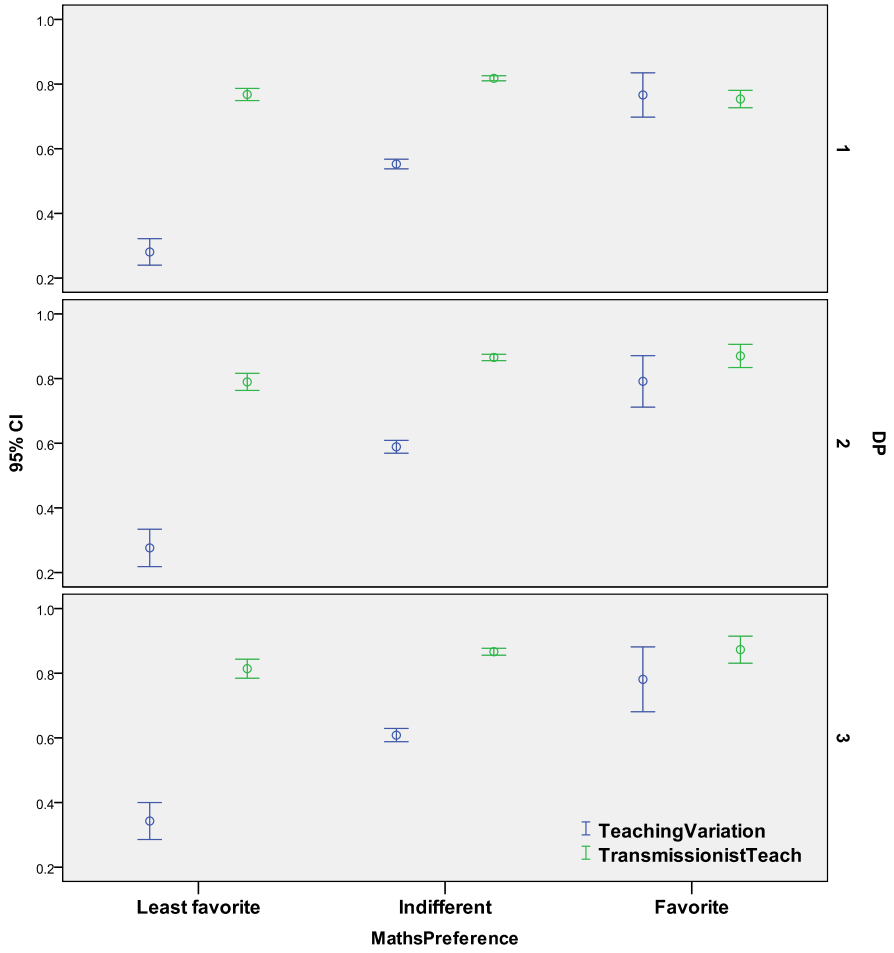

Figure 3 – Mean students' perception of teaching by preference to Maths group

As can be seen, there is a consistent and considerable difference in students' 'teaching variation' scores, with students in the favourite group scoring significantly higher than the other two groups: the more diverse the maths lesson the more the students report it as their favourite. The picture with the transmissionist scale is more mixed with no apparent consistent differences.

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