

The linguistic challenges of the transition from primary to secondary school

We are an ESRC-funded research project based at the School of Education at the University of Leeds, working in partnership with Huntington Research School and Lancaster University's Centre for Corpus Approaches to Social Science.

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Background and introduction to the project

'The linguistic challenges of the transition from primary to secondary school' is a project bringing together academic and professional expertise from the University of Leeds and 13 schools in the north of England, in partnership with Huntington Research School, York.

The transition to secondary school is a well-known source of stress to many students, and we speculated that some of the issue is not just social but also to do with the change in the language of school. In Year 7, students move from working with just one or two teachers who know them well and cover most of the curriculum, to a number of subject specialist teachers, working to multiple targets in each subject. This is also the time when they start having to engage with subject-specific language, and a more formal academic register.

We wanted to investigate the problem using modern computer techniques. We worked with five secondary and eight primary schools to collect language from Years 5 through to 8, across English, Maths, Science, History and Geography. Teachers advised us on what to collect to reflect students' experience of school language. We now have an electronic 'corpus', consisting of transcribed lesson recordings (teacher talk only, student contributions not transcribed for ethical reasons), textbooks, worksheets, assessments, PowerPoint presentations and other written materials. We are able to sub-divide this into spoken and written sections; KS2 compared to KS3; individual year groups and different subjects. We can use computer software to compare different parts of the corpus against each other: for example, KS2 Science against KS3 Science. We have analysed this to find out which words are new, or much more frequent, in KS3 compared to KS2. We are **not** making value judgements about what we find. Teachers are the specialists here, and students need to learn disciplinary language. We are trying to describe what the language is, and present this in a way that might help to support students.

Number of new words

Tokens and types

Linguists work with two different understandings of 'word'. When someone says they have to write a 3000 word essay, they mean the total number of words, which would include many repetitions. It is likely to include several hundred occurrences of 'the' for example. 'Words' in this first sense are called **tokens**. Our corpus contains nearly 2.5 million tokens-- a word count roughly equivalent to 30 average length novels.

Mostly, this project has looked at the other way of thinking about word, word **types**. When we say that a young child learns about five new words a day, or that most adults have a vocabulary of over 20,000 words, we are referring to this second sense, **types**.

Amount of tokens

Early on in collecting our data, we noticed something about tokens. In collating and transcribing, we realised that in a typical five hour school day, a student in KS3 is exposed to massively more language, in terms of tokens, than in a typical day in KS2. It is very difficult to measure precisely, but we are looking at multiples, perhaps three or more times as many words coming at students in the same period of time, through teacher talk and written texts. This is because all written materials are much, much denser at KS3 than in KS2: PowerPoints, worksheets and textbooks are all crammed with words and students are pushed through them quickly.

Furthermore, our lesson transcripts suggest that teachers talk for a higher proportion of lesson time, and at a faster rate. Even if this language was all very familiar to students, the increase in quantity would pose an increased cognitive burden. However, we know that the language is not the same-- there is a lot that is new.

	Maths	Science	English	History	Geography	Total
KS2	175,000	223,000	378,000	104,000	136,000	1,016,000
KS3	261,000	404,000	306,000	234,000	124,000	1,329,000
Total	436,000	627,000	684,000	338,000	260,000	2,345,000

Total tokens, rounded to the nearest 1000

Caveats to the data

This table shows tokens, which will include repetitions of words. Data was also drawn from more primary schools than secondary schools which will affect the number of tokens available for counting. The approach to sampling was deliberately flexible and open to make it as easy for schools as possible. They were asked to provide lesson content for two terms. This means that there is no guarantee that schools were studying the same topic content. For example, one primary school may have been studying earthquakes that term, but another may not which will also impact on the number as well as type of words being counted. The final caveat to keep in mind is that this table does not yet reflect every single token submitted to the project. There are still some uncounted tokens, though these are unlikely to be enough to shift totals dramatically.

Number of new word types

In every subject, except for English, KS3 shows a huge increase in the number of word types over KS2. In English, the focus on texts seems to deepen but narrow with a tighter range of reading material.

	Maths	Science	English
KS2	7,241	10,357	17,257
KS3	12,401	12,409	15,735
Difference	5,160	2,052	-1522

Key word lists

The corpus of words can be filtered to look at which words appear far more frequently at KS3 than KS2, or which are introduced for the first time in Years 7 and 8. The lists below are not exhaustive but give a sense of some of the most frequent, subject specific words. Words are listed alphabetically, not in rank order of frequency.

Maths	Science	English	History	Geography
Angles	Acid	Analyse	Agree	Climate
Corresponding	Atom	Annotate	Change	Development
Decrease	Compound	Create	Contribute	Environment
Enlargement	Element	Discuss	Control	Effect
Factorise	Mass	Effect	Evidence	Location
Multiplier	Objective	Evidence	Relatively	Natural
Probability	Participle	Explore	Rival	Population
Sample	Pressure	Reader	Revolutionise	Physical
Significant	State	Theme	Significant	Scale
Substitute	Transfer	Writer	Sources	Sparse

The challenge of polysemy

Polysemy is the capacity for words to have multiple meanings. The process that we have just described, of identifying new words, cannot tell us about the meaning of words. To look at word meaning, we studied examples of words used in school materials, compared to their use in everyday texts. We found that a large number of words have different everyday meanings and academic meanings. Students may know the everyday meanings but be uncertain of the academic meaning. For an adult, especially a subject expert, the relationship between the meanings is clear, but it might be less so for a student.

This was a particular issue in our science data. To study everyday meanings, we looked at a database, or corpus, of everyday language. Some examples are *store*, *reaction* and *force*, but there are many others. Examples of these from KS3 Science and everyday texts are:

Store

- Your body's chemical store of energy decreases. (KS3 Science, year 8 teacher talk)
- Does anyone know of an Apple store nearby? (Everyday use)

Reaction

- No atoms are lost or made during a chemical reaction, so the mass of the result equals the mass of the reactants. (KS3 Science, year 7 presentation)
- ... they kind of looked at me for a reaction. (Everyday use)

Forces

- The regular pattern of particles and strong forces explain why solids keep their shape and cannot flow. (KS3 Science, year 7 presentation)
- armed forces/ special forces / join forces (Everyday language)

KS3 Science also uses words in a very precise, specific sense, where the everyday use is more abstract, sometimes metaphorical

Pupil voice

As part of the project, pupil voice was conducted with a random sample of pupils. 30 pupils from 5 different primary schools (who then went to 3 different secondaries) were chosen and interviewed in Year 6 and then again in Year 7. The below are extracts from some of those discussions.

In the following, Year 6 students have been reading a passage and the interviewer asks them about meanings of words. The pupil tries to infer the meaning of *fertile* and thinks it means something like 'rich and varied'. This indicates how difficult it is to infer the meaning of unknown words, even when you see them in context.

Interviewer: *there is a word Granada's fertile valley what is fertile?*

Pupil: *fertile is like is it like a range of things it's like like there's a range of different things and it's kind of...*

Interviewer: *so you could infer the meaning of fertile here?*

Pupil: *it's like so let's say there was like a restaurant like an Italian restaurant and different kinds it would kinda be like fertile cos like there's like different things there and it's not all like the same and it's like different like cultures and stuff*

In the following, Year 7 students were asked which words were hard for them. Pupil B thinks they know what 'significant' means for their Maths lessons but the understanding is not quite there. We found a number of everyday uses of significant to jokily describe 30th, 40th, 50th etc. birthdays i.e. in 'I had a significant birthday'. This may be where the student gets the 'special number' meaning from.

Pupil A: *this one time this question was really hard for all of us 'cos we haven't learnt this word it was significant*

Pupil B: *yeah significance and now oh yeah and now like I get it so I know what it means*

Interviewer: *mhm*

Pupil B: *and I can do the questions*

Interviewer: *so what does it mean?*

Pupil B: *it means the special number I think*

Ethical approval for the project was given by the Ethics Committee of the Faculty of Social Sciences at the University of Leeds. Students and their parents or guardians consented to the interviews twice, in Year 6 and again in Year 7.

Practical ideas for application in schools

A coherent vocabulary approach will ensure that certain words (knowledge) are likely given more emphasis and there are strategies for making sure instruction around the word goes beyond merely a definition. There are a range of different options available, plus in-house developed approaches will be just as valid, as long as they provide opportunities to unpack the meaning of words.

Quigley	Marzano
Select	Provide definition
Explain	Pupils restate
Explore	Visual representation
Consolidate (revisit)	Develop (synonyms, images etc.)
	Use in discussion
	Word play (Taboo, Just a minute)

Example approaches

Individual teachers, departments or year groups can consider how they might develop their approach to vocabulary along the lines outlines above, but the case study following is an example of how this might be done to support around the academic transition between primary and secondary. It is shared not to provide a definitive template of an approach but to elucidate some areas of consideration for schools.

Case study

Huntington Secondary School undertook a small trial in the summer term of 2022. Two feeder primaries (one control, one intervention) completed questionnaires involving questions around pupil feelings of confidence in terms of the difficulty of work at secondary school, as well as specific questions about key words chosen for English and Geography.

The intervention school then received two 30 minute vocabulary sessions a week for four weeks to allow explicit instruction around eight key words from English and Geography. They then repeated the same questionnaire.

Selection

Eight words were chosen for English and eight for Geography. Eight were chosen to reflect the amount of time available for staff for delivery. Each week pupils in the intervention school would receive a 30 minute session on two English words and an equivalent session for two Geography words. These sessions were delivered by secondary subject specialists to around 55 pupils in the school hall.

The selection of words was made on two criteria:

- a. Using the Leeds corpus as a starting point to look at words more frequently found at KS3
- b. Knowledge of secondary staff of their curriculum in year 7 and which words they thought would be most beneficial

Explain and Explore

The vocabulary sessions were always centred around a Frayer model [a graphic organiser developed by Dorothy Frayer] for the key word. The model shown below adapts some of the box headings from Frayer’s original model. Pupils were always given the definition to ensure consistency. Activities in the session centred around pupils discussing and completing the remaining boxes to unpack the word in more detail.

<p>Definition (what does the word mean?)</p> <p>To look at words in detail</p>	<p>Where have you heard the word used? (which lessons, books, TV shows. Certain people who might use this word)</p>
<p>Analyse</p>	
<p>Linked ideas/information</p>	<p>Image</p>

Consolidate

Sessions would always start with a recap of the words from the previous week before moving on to the new words. As part of the pre and post questionnaire, pupils were asked multiple choice questions regarding the definition of ten of the key words they had been introduced to (five English, five Geography). Ten words were chosen from the total of 16 that had been delivered to keep the questionnaires to a reasonable length.

The questionnaire and results can be seen at the end of this booklet.

Next steps

- Ensuring selection of words from the Leeds corpus for each of the five subject areas is narrowed based on KS3 requirements.
- Consider how more of the feeder primaries can be involved. Primaries may be asked to choose from a shortlist of words that they can then deliver themselves in the final summer half-term. Choice for primaries will be important so they can reflect the content of their own curriculum and the amount of time they may be able to assign to delivering the vocabulary instruction.

- Developing central resources for the words that can then be adapted by primary schools.
- Considering how to monitor impact on pupils in the first half-term/term of year 7. Using pupil questionnaires and interviews to get a sense of impact on confidence in lessons and knowledge of key words.

Vocabulary questionnaire

This questionnaire is designed to help us gain a better understanding of how you feel the work might be different between primary and secondary school. There are no right or wrong answers. We just want to know what you think.

NAME _____

1. How confident do you feel about being able to do the work at secondary school?
Select one number.

1	2	3	4	5	6	7	8	9	10
Not at all Very		Very little		Some confidence		Quite a bit			

2. Do you think the work at secondary will be...

The work will be...	Tick 1 box
Much easier	
Easier	
About the same	
Harder	
Much harder	

3. How do you feel about the work you do **now** in different topic areas? Select one option.

English work:

Very easy	Easy	Just right	Difficult	Very difficult
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Maths work:

Very easy	Easy	Just right	Difficult	Very difficult
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Geography work:

Very easy	Easy	Just right	Difficult	Very difficult
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Science work:

Very easy	Easy	Just right	Difficult	Very difficult
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History work:

Very easy	Easy	Just right	Difficult	Very difficult
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4. Just thinking about English, how many of the words do you think you understand in lessons? Select one option.

Hardly any	A few	Most of them	All of them
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5. Just thinking about Geography, how many of the words do you think you understand in lessons? Select one option.

Hardly any	A few	Most of them	All of them
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6. Select what you think is the correct definition for each of the following words:

- i. Analyse
 - a. To look at in detail
 - b. To make a decision
 - c. To come to a conclusion
 - d. To understand everything

- ii. Evidence
 - a. Things that are left behind
 - b. Things you can see
 - c. Words you take from a text/story
 - d. Putting a story in your own words

- iii. Effect
 - a. What the words in a story mean
 - b. What the reader thinks or feels
 - c. To make us feel sorry for a character
 - d. The most important parts of a story

- iv. Annotate
 - a. Putting a story in your own words
 - b. The most important parts of a story
 - c. Making a list about what happens
 - d. Making notes/labelling next to the text/story

- v. Theme
 - a. The main ideas and messages from a text/story
 - b. The main ideas you have about a story
 - c. The shorter version of the story
 - d. Words you take from a text/story

- vi. Physical
 - a) When something is moving
 - b) The natural parts of Earth
 - c) Pushing something with force
 - d) The man-made parts of Earth

- vii. Population
 - a) Adding more people into a place
 - b) People leaving a place
 - c) The number of people living in a place
 - d) Too many people in a place

- viii. Development
 - a) People adding new buildings to a place
 - b) A place that is getting bigger
 - c) When things get worse for people
 - d) An improvement in people's daily lives

- ix. Scale
 - a) Is looking at places of different sizes
 - b) A type of skin that some animals have
 - c) A measurement on a map
 - d) To climb up something

- x. Sparse
 - a) A town in Scotland
 - b) A place which has lots of space per person
 - c) A place with lots of trees
 - d) A place which has very little space per person

Questionnaire results comparison

Question	Intervention school pre (51 responses)	Intervention school post (45 responses)	Control school (53 responses)
1. Confidence to do the work at secondary school	61% at 7 or higher	73% at 7 or higher	50% at 7 or higher
2. Work at secondary school will be...	77% hard or much harder	76% hard or much harder	83% hard or much harder
3. How do you feel NOW about work in English	22% difficult 63% just right	18% difficult 71% just right	13% difficult 74% just right
4. How do you feel NOW about work in Geography	28% difficult 47% just right	31% difficult 51% just right	26% difficult 47% just right
5. How many words NOW understood in English	94% most or all of them	87% most or all	91% most or all
6. How many words NOW understood in Geography	67% most or all of them	67% most or all	66% most or all
7. Analyse	80% correct	98%	79%
8. Evidence	43% correct	71%	49%
9. Effect	53% correct	78%	68%
10. Annotate	37% correct	67%	51%
11. Theme	63% correct	78%	70%
12. Physical	31% correct	58%	3%
13. Population	88% correct	93%	77%
14. Development	41% correct	47%	47%
15. Scale	37% correct	51%	62%
16. Sparse	35% correct	71%	23%