

First Language Interference: A guide for teachers of mathematics



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Introduction



- I teach in Further Education in the UK, mostly adults studying E1 to L2 Functional Skills maths, and GCSE maths; many adults want to progress on to Access to HE courses
- Approx. 25% of my students are English language learners (ELL), half in discrete ESOL FS maths classes, half in GCSE groups
- Research interests include maths as a vehicle for language acquisition, the volume and complexity of language in mathematics and maths anxiety in adults. The last two may be related.

Content of presentation



- Why is this important?
- First language interference for EL learners studying maths in English- sentence structure, words, sounds and false friends
- Differences in the language of mathematics- symbols, procedures, words with contrasting non-maths meanings and words exclusive to maths
- Impact on ELL and English speakers
- Actions and initiatives

But first, references:

References



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Also drawn from our learners, my colleagues and personal experience

Why is this important?



Two cases studies:

1) Polish learner, FE college for ESOL; economic migrant, Entry 1 level English, Masters degree in Mathematics (L7) in Poland. Maths assessed at Entry 3 (below L1) in English. Target set at E3 due to language level. Scraped a pass

2) Chinese learner, international student, at university in UK for Mechanical Engineering; failed 1st year and dropped out: the use of Greek letters, such as mu (μ) not seen in China

Plus:

3) Restricted talk becomes restricted learning (Barwell)

4) Consider the cognitive load on students and how it could impair learning

FLI in Sentence Structure



Written language not always left to right, could be top to bottom (Chinese, Japanese), or right to left (Arabic, Urdu)

Punctuation-not always used in Arabic, Thai or Korean (a gap is left instead); no possessive apostrophes in French; comma placed after verb (Scandinavian languages, German); comma after subject (Turkic languages); a full stop is a vertical line in Hindi

Upper and lower case- not present in Chinese, Arabic or the Sanskrit languages (Urdu, Farsi, Hindi, Punjabi, Bengali, Korean)

Nouns carry gender-(French, Spanish, German, Urdu, Hindi) and can be capitalised (German) or not (Spanish, French)

Nouns as objects take their gender 'She has lost his bag'

Word order: "Found someone, you have."

Arabic: sentences start with a verb; Turkic, Tamil(Dravidian), Sanskrit languages: verb comes last.

FLI in Words



Verbs: 'to be' does not exist in Arabic, Turkish, Thai; 'to be' and 'to have' are switched (French, German, Italian, Polish); 'to do' does not exist in German, French, Italian, Hindi, Urdu, Punjabi, East African languages..

Articles: 'the' does not exist (Japanese, Russian, Turkish, Urdu..); no 'a' (Arabic, Hindi, Urdu, Malay, Indonesian..); Different use of articles 'The human beings are strange' (Scandinavian languages, French, German)

Less or different use of prepositions: in, on, at, under, for, of, etc (European languages, Turkish, Arabic..)

Countable and uncountable nouns differ (and their quantifiers): news, trousers, pyjamas, scissors, information, advice, expenditure, time, money, hundred..

One word or two? Hear/listen, find/look, lend/borrow, odd/even, much/many, a.m and p.m, which/what, some/any, comparatives/superlatives..

Negative question responses: yes for no (Thai, Korean)

Watch for nodding of head- it may not indicate understanding! Japan: respect for speaker, Korea: thank you

FLI in Sounds



English has a northern European alphabet, differs from Eastern Europe, Russia, completely different elsewhere in the world

Missing sounds: no 'th' sounds in Irish, Swedish, Norwegian, Danish, French, Russian, Polish, Arabic, Farsi, Dravidian languages, West or East African languages; no 'w' in Chinese, Spanish, Turkish, German..

Switched sounds: 'i' and 'e', 'v' and 'w' in Polish; 'l' and 'r', 'v' and 'b' in Japanese

Diphthongs for pronunciation: vowel and consonant clusters common in English, not always used elsewhere: accents to change vowel sounds are common (Spanish, French, Irish, German..)

Stress in words differs: Japanese pronounce each syllable equally, English stress is on 2nd syllable; ends of words not pronounced in Chinese and French

FLI in Mathematical Symbols and procedures



- Use of , and . is switched in most non-English languages, i.e. 3,15 Euros is 3 euros, 15 cents and 10.006 is ten thousand and six
- The division symbol is : rather than \div
- A dot in the middle of a line between two numbers is not a decimal point; it means multiply in Eastern Europe, and at higher levels of maths elsewhere
- Division sums look very different throughout the rest of Europe and most parts of Africa
- Rounding and estimation are not present in China or Japan

Words in mathematical language



Some words have more than one meaning, a ‘normal’ one and a maths one: product (hair gel or multiply?), expand (get bigger or multiply out?), factors (events that affected a decision or integers of multiples?), modal (verbs can be modal- can, may, will, or most common number in a set?), chords (music notes played in unison or line across a circle?), table, change...

Other words are used for mathematical concepts, but do not appear in non-maths language: integer, factorise, median, indices, circumference...

The context is critical to comprehension and often only obtainable from the language. This affects English speakers as well as EL learners.

Actions and Initiatives



- Define key words and leave up for whole session
- Use pictures on worksheets, annotate if possible
- Repeat explanations in a clear voice- changing the wording or word order may increase the confusion
- Encourage the use of dictionaries, check definitions!
- Signpost learners to internet material- BBC Skillswise & Bitesize, Khan Academy, You-tube videos, ESOL Nexus (British Council)
- Discuss phone apps- Block Puzzle, Tessify, Tetris..
- Watch out for false friends: 'no' in Polish is informal 'yes'; in Scandinavian languages 'rent' is rate of interest, 'first' means 'not until' and 'offer' is a sacrifice; 'sensible' in Italian and French means kind or sensitive and 'lecture' means reading..