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ANALYSING THE LANGUAGE DEMANDS OF LESSONS TAUGHT IN A SECOND LANGUAGE

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ABSTRACT. *Teaching subjects in a second language to learners who are not yet fluent in the language of learning increases the cognitive demands which lessons make on them. Effective programmes therefore require a pedagogy which compensates for these increased learning demands. Without it, learning may be less effective and programmes may exclude learners who cannot meet these demands. The key feature of this pedagogy is language support. To provide it, teachers need to be able to analyse the language demands of lessons. This paper describes categories which can be used for the analysis of language demands in L2-medium subject lessons. It also discusses the degree to which subject teachers working in L2 can be expected to perform this analysis.*

KEY WORDS: *Language Demands, Support, Academic Proficiency, CLIL.*

1. INTRODUCTION

Two concepts at the heart of education in a second language are language demands and language support. Subject teachers need to be aware of the demands their lessons make on the L2 abilities of their learners; and where the demands exceed those abilities, they need to provide language support. When language support is required but not given, learners may learn less than they would if they were learning in their L1. These concepts are crucial in two respects. One is a matter of principle: that L2-medium education is not effective without them. The other is a matter of practice: that a lot of current L2-medium education may be less than effective because it does not take them into account. In this paper I would like to describe the concept of language demands analysis.

2. TEACHING UNFLUENT LEARNERS

A lot of education in L2 is done with learners who are not yet fluent in the language of learning. Thus they are learning new curricular concepts and new language at the

same time; what is more, they are learning the new concepts through the medium of the new language which is the vehicle for those new concepts. If you ask a learner to do this without support, you reduce their capacity to learn. Stakeholders in L2-medium education programmes with unfluent learners may not always understand that the tendency of these programmes is to make learning more difficult. To maintain or increase levels of subject-learning will therefore require a supportive pedagogy. In this paper, I will refer to contexts in which CLIL learners are not fluent.

Learning in L2 is difficult for learners with undeveloped L2 ability because one cannot do two things at once. School learning in general involves a lot of cognitive effort and the main tools we use for it are linguistic: we read, write, listen and speak to learn. Effective learning relies on language skills which are top-down or procedural (Anderson 1983). That is, they have become automatic: we can use them without paying attention to them. This allows us to assign as many of our attentional resources as possible to the learning of new concepts. When language skills become less reliable, they compete for the learner's attention, which is then partly diverted from new concepts to the language being used to acquire them. This happens naturally and routinely in L1-medium learning as we hone language and learning abilities. But the more often it occurs, the less effective learning becomes. When unfluent learners learn in a L2, they are often using undeveloped language abilities on which they cannot rely sufficiently. Without support, their attention is constantly drawn towards how to use L2 for learning and is thus less available for focusing on curricular concepts. Their mental resources may be stretched beyond what is accepted in L1-medium learning: pace is reduced and efficiency compromised. To maintain or increase the effectiveness of learning as compared with the L1-medium classroom, subject teachers need therefore to use a pedagogy which compensates for undeveloped L2 ability and divides attentional resources less, by supporting learners in using L2 skills within subject-learning tasks.

3. Language support

A pedagogy which reduces the cognitive demands on learners can provide support in two main ways. Firstly it can reduce the language demands of the task, allowing learners to attend more effectively to concepts. Secondly –but less commonly– it can reduce the conceptual demands of the task, allowing learners to attend to language. The main features of language-supportive pedagogy are:

- The use of a range of specific language-supportive task types to help learners when listening to teachers talking about subjects, reading subject textbooks, talking about subjects in groups and writing about subjects (Clegg 1999, Gibbons 2002).
- The use of a specific range of visuals (graphs, charts, diagrams etc) for supporting the understanding of subject concepts (Mohan 1987).
- Variation in forms of interaction: plenary, groups, individual work.

– The use of a style of teacher talk which is both extra comprehensible in the L2 (through the use of signals of organisation, summary, redundancy etc) and which also shapes the L2 talk of students (by varied question types, prompts, modelling and feedback etc) (Echevarria *et al.* 2004, Moore this volume).
– The judicious use of the L1 in the L2-medium lesson.
– The teaching of learning strategies for learning subjects in L2.
– Techniques for assessing subject knowledge which has been acquired through L2.

4. Language demands

To provide language support, a teacher working in L2 needs first to know what language demands a lesson will make on learners. The language demands of a lesson are the language abilities which the learners need in order to participate effectively in the lesson. They can be described in terms of conventional categories for describing language use, e.g. vocabulary, grammar, function, discourse, language skills (listening, speaking, reading, writing). Although the language demands of lessons are the same for all learners, not all learners have the same language needs with respect to these demands. They may differ quite widely in their ability to use language to respond to the language demands of tasks. Teachers know this when they teach in the learners' L1 and can respond to a range of abilities. The same is necessary when teaching in the L2. Teachers have to provide degrees of language support. Most language support tasks, for example, are capable of being adjusted to provide more or less support. Similarly, experienced CLIL teachers are able to modulate their talking style to accommodate learners who understand less or more, or who need more or less prompting to respond. Thus language demands and language needs are two sides of the same coin: if you ask yourself where in a lesson the language demands may be too high, you also have to ask how learners may differ in their need for support in order to meet those demands.

Analysing the language demands of lessons is crucial to lesson-planning in CLIL. If you do not do it, you cannot predict at which points in the lesson the learners will need help. And without that, you cannot provide the language support they need to carry out the required learning tasks. At least some learners with lower L2 abilities will then fall short of what they would have been able to achieve if they had been working in their L1: their work will be a little less effective or a little slower; and their level of achievement in the subject will be that little bit lower. In particular, certain groups of learners may be disadvantaged. It is possible that learners from less educated backgrounds and with low socio-economic status (SES) may find learning in L2 more difficult than their more privileged peers (Baker 2001). Inadequate language support in CLIL may affect them more than others. The same is true of the specific category of children of recent immigrants to Europe who combine low SES with undeveloped ability in the language of learning. In the long run, failure to provide adequate language support can mean lower levels of subject achievement for the learner and disappointing results for the programme; both of which, with normal, appropriately supportive teaching, are avoidable.

5. A LESSON

Let us look at an example of a L2-medium lesson which makes definable language demands on learners. In the lesson shown in table 1 the teacher will teach the topic of *melting* to children of, say age 8-9, perhaps in their 3rd year of learning English as a foreign language. How the teacher plans the lesson is shown in table 1. Column 1 shows the stages of the lesson, columns 2 and 3 show what the teacher and learners do. Column 4 shows the form of interaction. The language demands of the lesson are shown in column 5 in three categories. The skills are the classical four skills of listening, speaking, reading and writing. The aspects of language are to do with vocabulary, such as *melt*, items of grammar such as the present simple, and text-level items such as connectors and markers of language functions such as *will* for predicting. The functions column shows the types of function normally involved in school language use, namely cognitive functions or thinking processes. The final column shows the kinds of language support the teacher can use to help their learners meet these demands.

TABLE 1. *Melting: the language demands of a science lesson on learners (Harrison and Moorcroft, 1996)*

Stage	What the teacher does	What the learners do	Inter-action	Language demands (learner)			Forms of support
				skills	language system	functions	
1.	Introduces topic and items in picture/ classroom	Listen to teacher introducing the lesson and the materials.	whole-class	listen	vocabulary	describing	visuals, objects
2.	Gets learners to predict	Talk in groups and predict. Report predictions	groups whole-class	talk	grammar vocabulary	predicting	chart use L1 substitution table (table 2)
3.	Give instructions for the experiment	Listen to teacher giving instructions	whole-class	listen	vocabulary connectors instructions	instructions	visuals, objects, list of instructions

4.	Monitors groupwork	Carry out the experiment Record observations	groups	talk talk, write	grammar phrases	observing	chart use L1
5.	Gets learners to report, compare predictions with observations and draw conclusions	Report observations Compare observations with predictions Draw conclusions/ summarise	whole-class	talk	grammar phrases	reporting comparing concluding	chart substitution table (table 2)
6.	Introduces writing task and monitors writing	Write report	solo	write	grammar connectors vocabulary	reporting	writing frame (table 3)

In this lesson, the teacher wants to get the learners to find out that things melt at different temperatures. To do this they conduct an experiment by putting a variety of things that will melt into a plastic bag, lowering the bag into water at 5 different temperatures and recording the melting temperature. First the teacher introduces the topic and the task. The students work in groups and predict; they write their predictions using the chart in table 2; then they report their predictions to the whole class. Then they do the experiment and record their findings using the chart in table 2. After that they report their observations to the whole class and the teacher gets them to compare what they found with what they predicted. Finally the teacher gets them to draw conclusions. After that –and probably in the next lesson– they write about what they did.

Let us analyse the language demands of this task sequence and consider the kinds of support the teacher may need to offer. The lesson involves some careful listening, especially in stage 3: the children have to understand what they have to do (especially the safety issues). The main language demands here are vocabulary and following a sequence of instructions, especially noticing time connectors and instruction verbs. To support the children with the vocabulary, the teacher uses the visuals in the book and objects in the classroom. To help with instructions the teacher might put them on the board and emphasise the time connectors (*first*, *then* etc) as they go through them.

Another key language demand is that at certain points in the lesson, children have to talk in English. Not, it is important to emphasise, during the group work: their language ability is not adequate for this and it is both natural and cognitively more effective for them to work in their L1. They can use L2, however, in step 2 when they report their predictions

to the whole class and in step 5 when they report their observations, compare them with the predictions and draw conclusions. There are several reasons for this: firstly these points are key learning moments in the class; secondly, L2 is appropriate for the public nature of whole-class work; and finally, it is easy for the teacher to provide language support for this public learning talk.

The substitution tables in table 2 are one way of doing this. The language demands of these talking events are limited. They involve engaging in certain scientific thinking processes –predicting, reporting, comparing predictions with observations and generalising– which require the use of a limited number of sentences all with a similar structure, but differing grammatically: *will* for prediction, past simple for reporting, present simple for generalising. They also make vocabulary demands: words for temperature and materials. Once the teacher has thought about these specific language demands, simple substitution tables spring to mind as one means of providing support. Such substitution tables were, of course, popular during the audio-lingual era but in those days the tables tended to be virtually meaningless from a communicative perspective. The content of learner production was secondary to the production itself. Now the reverse is true. Contrary to their use in audio-lingual FL methodology, their purpose is in CLIL to support learners linguistically, providing the necessary scaffolding and allowing learners to focus on the conceptual question at hand. In addition, the charts used for predicting and reporting (see table 2) are very supportive in enabling the learners to make sentences: the rows and columns virtually generate each sentence: *Margarine will melt in cool water; butter melted in hot water.* As with all support for talk in CLIL lessons, the crucial question to ask when analysing language demands is: what do I want the learners to say?

TABLE 2. *Substitution tables for 'Melting'*

1. Predicting

We think	candles butter margarine ice cheese chocolate	will melt	in	cold cool warm hot boiling	water

2. Reporting

Candles Butter Margarine Ice Cheese Chocolate	melted	in	cold cool warm hot boiling	water

3. Comparing

We thought	candles butter margarine ice cheese chocolate	would melt	in	cold cool warm hot boiling	water
But it/they melted					

4. Generalising

Candles Butter Margarine Ice Cheese Chocolate	melt(s)	in	cold cool warm hot boiling	water

After the experiment the teacher asks the children to write and will need to provide help with this. Again, a form of support can be chosen after analysing the language demands of the kind of writing the teacher wants them to produce. So again the question is: what do I want them to write? The writing makes demands at the text level: the teacher wants them to organise the text so that it shows sections: *objective, procedure, results, conclusion*; and to join their sentences together using simple connectors: *first, then, next, finally* etc. The teacher also wants them to write a few key sentences within each section, which makes grammatical demands on the learners. Finally the work makes lexical demands: they have to use the right words. At all these levels, they will need support. A writing frame, as shown in table 3, combined with the chart, should provide this.

TABLE 3. *Writing frame for 'Melting'*

Objective
We wanted to find out the melting temperatures of different materials

Procedure
First
Next
Then
After that
Finally

We predicted that...
We measured...

These words will help you:

melting temperature	cold
melt	cool
	warm
candles	hot
butter	
cheese	
ice	
chocolate	

Results

Material	Write P for prediction, R for results				
	Cold water	Cool water	Warm water	Hot water	Boiling water
candles					
butter					
margarine					
ice					
cheese					
chocolate					

Conclusion

We found that...melts in...

Different materials melt at different temperatures

6. Academic language proficiency

The language demands of the lesson as shown in table 1 are defined in terms of academic language competence –what Cummins (1984, 2000) has called Cognitive Academic Language Proficiency (CALP). When we analyse the language demands of CLIL programmes, it is in terms of this specialist variety of school language competence that we have to think. CALP is a concept which is widely discussed, but not well defined either in the literature or in practical debate. It is also, we should note in passing, not a concept which language teachers have been conventionally trained to use. Conventionally trained L2 teachers working in CLIL programmes often come fairly new to the idea of language for learning, as opposed to language for social intercourse. They have tended to focus on something slightly akin to Cummins's other related concept of basic interpersonal communication skills or BICS. In non FL L2 teaching, such as the immersion programmes in Canada teachers might not have to worry so much about BICS as learners may well acquire it outside the classroom. European CLIL teachers, however, will need to be aware of both concepts and of their learners' needs and to take these needs into consideration when planning. While BICS may develop as a result of general classroom discourse, CALP will need specific attention. Table 4 shows a list of categories describing the academic L2 abilities which learners in CLIL programmes have to develop and which these programmes have to teach them. We will look at these categories in more detail.

TABLE 4. *Cognitive Academic Language Proficiency: the language of learning*

a) Language skills
   - Academic forms of listening, speaking, reading, writing

b) Concepts/vocabulary, e.g.:
   - Subject-specific concepts
   - General academic concepts

c) Grammar, e.g.:
   - Complex sentence structure
   - Verb phrases

d) The language of thinking processes, e.g.:
   - Definition, classification, describing processes/objects/properties etc, cause and effect, time sequence, hypothesis

e) The structure of texts, e.g.:
   - Headings, numbering systems, paragraph organisation, connectors

f) Learning skills, e.g.:
   - Using the internet; using a library; note-taking; using graphs/charts; planning, drafting and revising writing, etc.

6.1. LANGUAGE SKILLS

School language use requires learners to use the academic forms and combinations of listening, speaking, reading and writing skills which they need to use language for learning: reading textbooks, following teacher presentations, producing academic writing, engaging in learning talk, etc. The literature on language for academic and specific purposes (e.g. Jordan 1997) describes these uses for the adult sector, as well as some of the tasks available to L2-medium subject teachers for providing support. Primary and secondary school language skills, and the task repertoire available for this age range, are less well described, though there are some useful studies e.g. Cameron (2003).

6.2. VOCABULARY

The vocabulary needed by learners learning subjects in L2 falls into two categories: firstly words which are specific to subjects and secondly words which are not specific to subjects, but which are used across the curriculum and are specific to school learning. Let us look at some examples of these two types.

Table 5 shows some subject-specific vocabulary used by a physics teacher in a lesson on the parallelogram of forces. The items in italics are high-frequency, narrow-range items, used largely in dealing with this academic topic only; typically for science, they contain a few items with both general and specific meanings. Table 6 shows lists of

phrases used in a science textbook to describe cells and tissues (Keith Kelly, personal communication). These are broad semantic notions which are not specific to this topic, but which are necessary for talking about it: you cannot talk about types, location, function and structure of cells without them; they are the lexical tools which we use to handle the subject-specific vocabulary of cells.

TABLE 5. *Subject-specific vocabulary*

FORCE	*VECTOR*
A force *acts on…*	
Forces *acting in ... direction*	*Equilibrium*
A force *acting against ...*	The forces *balance each other*
A *given* force	*Newton*
Parallelogram of forces	*Vertical* component
Triangle of forces	*Horizontal* component
Two forces *make up* a third force	*Force-meter*
Resultant	*Spring balance*
The *sum* of all the forces	*Value*
Force G acts on a *body*	*Magnitude*
You *resolve* the force *into its*	*Mass*
components	*Constant*

Both these classes of words contain items which are less frequent, more formal and specific to academic contexts. Subject-specific vocabulary, however, is well-described, available in dictionaries, known to the subject teacher and explicitly taught in lessons. General academic vocabulary, by contrast, is often poorly described, difficult to locate in reference works, not consciously familiar to the subject (or language) teacher and rarely explicitly taught. Both, however, are needed by learners in CLIL programmes, the latter –because of its frequent cross-curricular use– arguably more than the former. Teachers in CLIL programmes therefore need routinely to teach these vocabularies.

TABLE 6. *General academic vocabulary: talking about cells*

Structure:	Types:	… is most abundant under…
		… is common in…
… are made up of…	… there are …	… is found mainly in…
… are organized in…	… have various shapes…	
… is a self-contained unit	… are divided into…	Function:
… contains…	… are arranged in…	
… feels/looks like…	… resembles…	… have parts which…
… are separated from… by…		… builds up…
… are small…	Location:	… lines…
… tend to be…		… exhibits …
… can take other shapes…	… is found in…	… release…
… includes…	… surrounded by…	… connects…
… have…	… form…	… has the function of…
… consist of…	… includes…	… provides…
… are joined together… (to…)	… is located…	… builds up…

6.3. GRAMMAR

In contrast to vocabulary, grammar in academic language use is not different enough from social use to warrant further comment here, except that more complex forms may occur in school writing and that the verb phrase tends to be salient in general academic language –as seen in table 6. Cameron (2002) has usefully described the grammatical features of lower secondary school writers of English as an additional language (EAL) in the UK. In addition, from the pedagogical viewpoint, subject teachers are less likely to provide support for grammar than for, say, vocabulary; though they do need to be able to offer simple sentence-level support for talk and writing such as the substitution tables in table 2.

6.4. THINKING PROCESSES

In contrast to conventional foreign language syllabuses, L2-medium subject teaching highlights academic rather than social language functions. School learning routinely requires learners to use a limited number of thinking processes, including: defining, classifying, illustrating/exemplifying, contrasting, comparing, giving reasons, predicting, summarising, hypothesising, time sequence/process, listing, adding, apposition, drawing conclusions/deducing. Both learners and teachers in CLIL programmes need to know explicitly which thinking processes subjects regularly require learners to engage in and how to express them in L2. Table 7 illustrates for two of these processes –defining and classifying– the kinds of questions which teachers often use to

stimulate the thinking process and the kinds of statements which learners and teachers make when engaging in it.

In L1-medium education it is uncommon for subject teachers to teach explicitly the thinking skills which their subject requires and the forms of words which are used to express them. As with general academic vocabulary, these skills and their language exponents are poorly described and not easy to find in reference works. But it is precisely these sets of phrases which routinely constitute the language demands made on learners especially in oral and written tasks, from the lowest age groups upwards as seen in the lesson above. We may get away with not teaching them in L1, but in CLIL programmes, teachers providing language support for talk and writing will need to have continuous recourse to lists of thinking process and their language exponents, of the kind shown in table 7.

TABLE 7. *Thinking processes (Defining, Classifying) and their language exponents*

DEFINING

Teacher questions:

What is a…?
Give me a definition of a…
How would you define a…?
Who can define/give me a definition of…?
Can anyone give me a definition of…?
What do we call this?
What is the name/(technical) term for this?

Statements

(A)	.....	is a	(generic term) place person thing concept entity device instrument tool etc.	where who which that for...	..... -ing ...

… is called/said to be …
The term/name for this is…
We call this…

CLASSIFYING

Teacher questions:

How would you classify…?
How many kinds of …are there?
Who can classify…?

Statements

There are	two three (etc.)	kinds types forms classes categories	of	.....

.....	fall can be divided classified	into	two three (etc.)	kinds types classes categories

We/you/one can classify … according to …criteria
This class has…characteristics/features

6.5. The structure of texts

Discourse structure is both a crucial feature of school language use and the surface reflection of the forms of thinking which academic disciplines require. Learners in both L1 and L2 need to attend to genres and text-type characteristics which are typical of subjects, both in order to understand and produce texts, and in order to learn the thinking processes which are peculiar to subjects. In CLIL programmes, where language demands are high, it is thus especially important to support learners in developing familiarity with discourse structure when reading textbooks, following teacher-presentations, making oral reports and producing academic writing. Indeed one could claim that support at the level of discourse is more important than sentence-level support in L2-medium subject lessons, both because learners achieve clarity of thought more effectively at the discourse level, and because subject teachers can provide discourse support more readily than support for grammar.

6.6. Learning/study skills

This category refers to the array of learning strategies which underpin school learning, but which, again, only a minority of schools teach explicitly in the L1. It is a large

category including strategies to do with access to and retrieval of information, the production of oral and written texts, reading and listening in academic contexts, recording data, using visual forms of information, learning through oral interaction. With regard to learning in L2, the main point to make is that the higher the language demands of lessons, the more necessary it is for learners to be able to deploy these strategies. We may, as already mentioned, get away with not teaching them in the L1, but in CLIL classrooms, learners who cannot use L2, for example to take notes from teacher-presentations, plan and revise their writing, interpret graphs or report the outcomes of group work risk achieving reduced levels of subject knowledge.

7. The demands on subject teachers

The purpose of this chapter is to set out the concept of language demands analysis within subject teaching in L2 and to present it as an obligatory process in the planning and delivery of lessons using the language-supportive pedagogy which L2-medium education requires. When you look in detail at the nature of L2-medium school language demands, they can look daunting. School language use is complex. In addition, we have been looking only at the language demands on learners; those which lessons make on teachers are equally complex. We have also excluded the detail of language-supportive pedagogy: teachers need not only to be able to predict the language demands of lessons but to deploy the array of teaching strategies which will help learners develop the language abilities with which to meet these demands.

However, all professional skills look complex when analysed. Language demands analysis is routinely practised expertly by trained CLIL teachers; it is done almost on the hoof and even partly unconsciously as part of lesson planning and integrated seamlessly with the provision of language support. The same is true of teachers doing similar work, for example in the education of language minority students for learning in the majority language in industrialised countries, such as teachers of ES/AL in the USA or UK (Clegg 1996). It is to the untrained teacher of a subject in L2 that skilled work of this kind can look daunting. That is one consequence of CLIL programmes which do not use formally trained teachers: INSET is not usually sufficient to equip a conventional subject teacher to work in L2; whereas initially-trained CLIL teachers take it in their stride.

L2-medium subject teachers can also look to other sources for help with language demands and language support. They should be able to look to materials: published materials present language support as a *fait accompli*: demands have been analysed and support provided. However, in Europe, we have few published materials. Teachers normally construct their own. As long as we ask them to do this, we are requiring them not only to spend much more time preparing lessons in the L2 than they spend for lessons in the L1; we are also expecting them to build into these lessons forms of support which many have not been trained to provide.

Language teachers in CLIL programmes can also provide some help to L2-medium subject teachers: they can develop the learners' grammar, thinking, discourse and study

skills, and to a lesser degree their vocabulary skills. But it is a misapprehension to believe that language skills are separable from subject teaching and can be hived off for someone else to teach. Teaching subject concepts and the skills of acquiring and handling them is the responsibility of the subject teacher and language is at the heart of that process. In CLIL programmes, subject teachers cannot maintain high levels of subject achievement without becoming familiar with language-supportive methods.

One other source of support for CLIL teachers, however, should be mentioned. Most of the language abilities which we have described are not peculiar to L2: they are used by all learners throughout the L1-medium curriculum. Much of academic literacy, when developed in L1, transfers to L2 (Cummins 2000). In addition, L2-medium programmes work best when learners have already acquired strong L1-medium language and learning skills, especially in courses which highlight L1 CALP (Cummins 2000). This means that a school which offers CLIL would benefit from developing cross-curricular language policy for the use of L1 in learning. Some schools in Europe already do this: the UK National Literacy Strategy (DfES 2007) for the lower secondary school encourages subject teachers to teach the L1 language and thinking skills which their subject requires. These policies are good not only for L1-medium learning but for L2-medium programmes too.

In education in L2, the analysis of school language demands and the provision of language support enable learners working with language abilities which are less effective than their L1 skills to maintain or even increase the levels of subject knowledge they can attain. CLIL programmes which fail to use these procedures may under-perform and their learners may under-achieve. They need, therefore, to be at the heart of CLIL training.

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