Chapter 4
Disconnects in Bilingual Education Settings and Research Traditions

Chapter Overview
This chapter serves as a critical 'hinge' or connection point between the theory-oriented chapters in the first half of the book and the practice-oriented chapters in the second half of the book by providing an analysis of possible kinds of disconnect that can be found in curriculums and pedagogies in bilingual education settings. These disconnects include intracurricular disconnects, intercurricular disconnects, pedagogical disconnects and disconnects among major research traditions bearing on the field of LAC, academic literacies and CLIL. How to 'bridge' these different kinds of disconnects will be dealt with in Chaps. 5–7.

4.1 Disconnect One: Intracurricular Disconnects

The first kind of disconnect has to do with the way a subject curriculum is organized around its *input genres* and *output genres*. Typically, the input genres (i.e. the kinds of genres that a student is exposed to and taught in) are different from the kinds of output genres in which the student is expected to be able to produce their assignments and assessment tasks. This kind of disconnect is especially pervasive in content subjects, and teachers of content subjects are often unaware of this kind of disconnect. In many English as an additional language (EAL) contexts, English is used as the medium of instruction (MOI) for content topics (e.g. in many schools in Hong Kong, some private schools in Thailand, Japan, Korea, and China). In these contexts, frequently the textbook publishers present the concepts and topics using one set of genres while the assignment and assessment tasks require the students to produce writing in a different set of genres.

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To illustrate this intracurricular disconnect, let us look at a question in the integrated science paper in the Hong Kong Diploma of Secondary Education (DSE) examination in 2012. The DSE is a high-stakes public examination that all senior secondary school leavers need to take at the end of Secondary 6 (Grade 12) in Hong Kong. In this question, students are asked to describe two measures that are used in nuclear power plants to ensure the safe use of nuclear energy. They are also asked to discuss whether using nuclear energy is better than using fossil fuels for generating electricity with reference to the impact of nuclear energy and fossil fuels on the environment (to see the entire question, please consult 'Hong Kong DSE Examination—Integrated Science Paper, Question 11', published by the Hong Kong Examinations and Assessment Authority 2013).

To successfully respond to the above question, students need to be able to not just recall all their knowledge about the topic but also organize this knowledge into an argument and present it in a combination of descriptive and discussion texts. However, when we look at the typical textbooks in integrated science available in Hong Kong, we can hardly find any examples of coherent texts in the discussion genre.

While this disconnect can be summarized as a mismatch between the input genres and the output genres that characterize a content curriculum, the source of this mismatch is much deeper than just an oversight on the part of the science curriculum developer. Rather, this mismatch seems to have its source in the domination of a certain theoretical tradition in education. Lemke (2010) points out that this disconnect seems to have originated from a dominant 'mentalist' tradition in education:

> If you ask most teachers of science what their main goal is, they will probably say: for my students to understand the basic concepts of physics, chemistry, biology, or whatever other field is being studied. The critical words here are 'understand' and 'concept', and both of these terms assume a fundamentally psychological approach to learning. They belong to the tradition of mentalism, in which concepts are mental objects and understanding is a mental process. In more modern terms, they belong to a cognitive model of science education. I do not believe that this kind of theoretical model can tell us enough to help us to become better teachers of science. I believe that it lacks the necessary vocabulary to tell us just what we must lead students to do in order to learn to reason and act scientifically. (Lemke 2010, p. 1)

The kind of 'necessary vocabulary' that is lacking includes what I was trying to introduce in Chap. 3 (e.g. the Genre Egg; see Fig. 3.4)—a vocabulary (or a metalanguage) to talk about the languages of the academic disciplines. However, if one looks at the way a content subject syllabus is usually written, one will discover that when it comes to communicating in science, the vocabulary used to write the curriculum goals is rather vague or general. For instance, there is only a half-page under the heading 'communicating' in the 147-page syllabus for Secondary 1–3 (Grade 7–9) science issued by the Hong Kong Curriculum Development Council. Under 'communicating' are listed the following skills:

- talking, listening or writing to sort out ideas and clarify meaning
- making notes of observations in the course of an investigation
- using drawings, graphs, charts and tables to convey information

- choosing an appropriate means of communication to suit the purpose
- recording of activities carried out

(Hong Kong Curriculum Development Council 1998, p. 17)

Nowhere in this half-page of the Syllabus can we find the kind of necessary vocabulary that Lemke (2010) calls for in order for textbook writers and teachers to realize the kind of *language modelling and scaffolding* work that needs to go into the design of the curriculum materials—both the written texts of the textbooks and the spoken texts in the classroom; that is, the way teachers and textbooks can *model* and *scaffold* communicating in science both in spoken texts and written texts, and in appropriate spoken genres and written genres.

It is precisely this modelling and scaffolding which is often absent from both the curriculum texts and the classroom interactions in many content lessons, not just the science lessons. And yet students are typically required to produce writing in appropriate genres in high-stakes examinations or assessment tasks such as the 2012 DSE question on nuclear energy discussed above. I call this kind of disconnect a *horizontal* disconnect within the content curriculum, to contrast it with a vertical kind of disconnect within the content curriculum, which will be discussed next.

A *vertical* disconnect has to do with the rather abrupt change in the nature and kinds of assessment tasks that students are required to do in the curriculum when progressing from junior levels to senior levels. For instance, typically in junior secondary content curriculums, students are required to complete tasks that require responses such as fill in the blanks, labelling, matching, one-word or two-word answers, or selecting an answer from multiple choices. Figure 4.1 shows some typical junior secondary science tasks found in Hong Kong textbooks. However, when a student proceeds to senior secondary levels, even though some simple tasks such as matching (see Fig. 4.2) can be found, the student is suddenly required to give extended answers in the form of paragraphs or essays. The simple tasks usually only account for a small % of marks in the examination in contrast to the extended text tasks. At the same time, the senior-level curriculum is more packed with sophisticated content topics and less time can be devoted to helping students to unpack and repack dense and abstract academic language required in the disciplines (see Chap. 3).

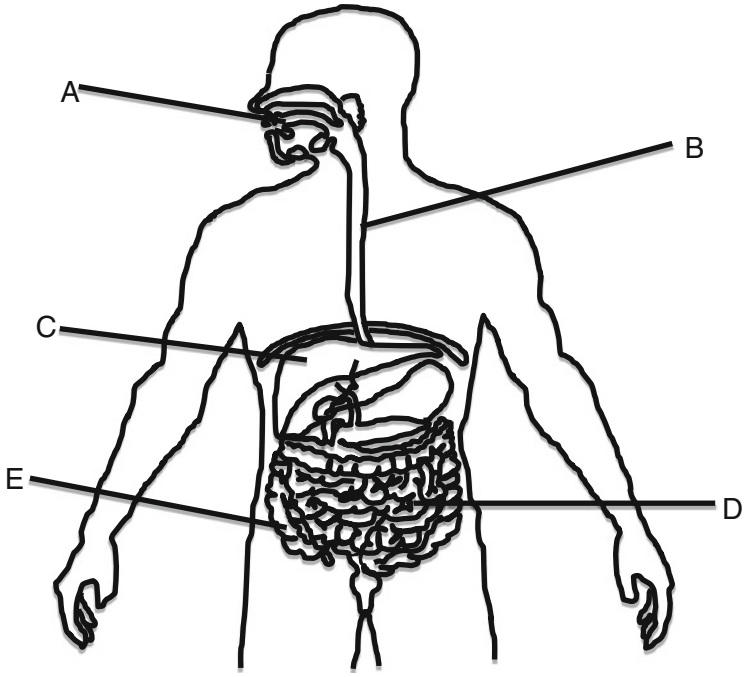
Application Scenario 4.1

Take a junior secondary textbook in your subject (math, science, history, geography, social studies, etc.) and compare it with a senior secondary textbook in the same or comparable subject. Compare the kinds of tasks found in the two textbooks and jot down the main differences between the tasks found in the two textbooks. Compare them in terms of the different kinds of language demands required by the tasks; e.g. what kinds of genres, language functions/sentence patterns, and vocabulary are required (refer to the Genre Egg in Fig. 3.4 in Chap. 3)? What kinds of language skills are required—receptive or productive?

Task 1

	Section Quiz: Write "T" for true statements and "F" for false statements in the boxes provided	T	F
1.	Animals react to stimuli but plants do not.		
2.	Non-living things show none of the seven characteristics of living things		
3.	The only way to study animals is to observe them in the laboratory.		
4.	When studying living things, scientists observe the characteristics of living things and record their observations.		

The diagram below shows the human digestive system



Task 2 Name the Structure A to E

Fig. 4.1 Some common junior secondary science tasks found in Hong Kong textbooks

1. For each of the parts of a cell listed in Column 1, select from Column 2 one description that matches it. Put your answer in the spaces provided. (3 marks)

Column 1		Column 2	
Ribosome	_____	A.	where some lipids are made
Nucleus	_____	B.	is differentially permeable
Smooth endoplasmic reticulum	_____	C.	where polypeptides are made
		D.	controls the activity of the cell

Fig. 4.2 A matching task modelled on questions found in the Hong Kong Diploma of Secondary Education (DSE) biology paper (reproduced here by permission of Dr. Kennedy Chan)

Both horizontal and vertical disconnects are within the same subject curriculum, with the horizontal disconnect happening at the same year level and the vertical disconnect across different year levels. There is, however, another kind of disconnect found across the curriculum.

4.2 Disconnect Two: Intercurricular Disconnects

There are often disconnects among the curriculums of content subjects (e.g. science, math, history, social studies, geography) as well as lack of coordination between the content subject curriculums and the curriculums of the language subjects (e.g. English as a foreign language subject, Chinese as the first language subject). Very often teachers and curriculum planners of content subjects and language subjects operate in insulated bubbles without talking to each other as if they do not need to know what is being taught and learnt in each other's subject domains, not to mention collaboration. In Chap. 2, we discussed the differences between BICS and CALP and the mode continuum and the need to provide students with ample support to help students move from the spoken mode of everyday language to the increasingly written mode of academic language. We also introduced Mahboob (2014)'s model of language variation along three different dimensions: (i) the continuum between everyday and specialized fields, (ii) the continuum between global and local tenors and (iii) the continuum between spoken and written modes. This model gives us eight different domains of language use as characterized by their different features on the three continua:

1. Local everyday written,
2. Local everyday oral,
3. Local specialized written,
4. Local specialized oral,
5. Global everyday written,
6. Global everyday oral,
7. Global specialized written,
8. Global specialized oral.

Typically, in the English language lessons, a student learns about the kind of language resources appropriate for use in domains 5–6 (global everyday written and oral). However, in the content areas (e.g. science, geography, history), a student is

confronted with the kind of academic texts and tasks typically found in domains 7–8. Students are thus not prepared by their English language lessons (domains 5–6) for the kinds of English language use in content subjects (domains 7–8). Students are also usually left on their own to make any connections across the different subject areas in their school curriculum. Every day they move from one subject lesson to another as if moving from one compartmentalized field to another without being helped to make any connections between these different fields of learning. Thus, school learning experienced by students often constitutes fragmented and insulated pockets of knowledge, values and skills unrelated to one another, and when confronted with novel problems that cut across the subject boundaries (as they often are nowadays, e.g. issues related to energy crisis, food safety, environmental protection, political participation) students cannot mobilize all the knowledge, values, and skills that they have learnt from different subjects as resources to help them come up with novel solutions to problems or new perspectives on issues. This section thus focuses on disconnects between content subjects and language subjects to see how these cross-curricular disconnects are not helping students to cope with content learning on the one hand and language learning on the other.

As discussed in Chap. 3, academic language (e.g. academic English) is characterized by high lexical density and complex nominal groups (noun-like structures), which stands in contrast to everyday language. For examples, look at the sentences in Application Scenario 4.2 and see if you can decide which subject area these sentences are taken from.

Application Scenario 4.2: Contrasting the kind of English found in content textbooks and the kind of English found in English as a foreign language (EFL) textbooks.

(A) The destruction of rainforests constitutes a great loss of resources to humanity and science.
(B) His decisive and farsighted acts in accepting the Truce of Villafranca, in stopping Garibaldi from marching on to Rome, and in allying with Bismarck made the unification movement possible.
(C) My name's Jennifer. I have lots of friends. We like reading magazines and going on Facebook.

Activity: Can you decide which subject area each of the above textbook sentences[1] belongs to?
What are the different language demands on the student in these different subject areas?
Can you analyse the different kinds of lexical and grammatical complexity using the concepts and terminology learnt in Chap. 3 (e.g. refer to the Genre Egg in Fig. 3.4)?

[1]Note1: For copyright issues, these sentences have undergone some modifications.

Table 4.1 A basic structural analysis of sentences from different subject textbooks

	Noun (group)	**Verb**	**Noun (group)**
(A)	The destruction of rainforests	constitutes	a great loss of resources to humanity and science.
(B)	His decisive and farsighted acts in accepting the Truce of Villafranca, in stopping Garibaldi from marching on to Rome, and in allying with Bismarck	made	the unification movement possible.
(C)i	My name	's	Jennifer.
(C)ii	I	have	lots of friends.
(C)iii	We	like	reading magazines and going on Facebook.

As you might have guessed, (A) comes from a social studies textbook, (B) from a history textbook and (C) from an EFL textbook. They are all from the same grade level (Grade 10).[1]

As discussed in Chap. 3, we notice that (A) and (B) are characterized by complex noun groups but a relatively simple clausal structure. Table 4.1 shows a basic structural analysis of the sentences.

The disconnect in terms of the kind of language used in academic content subject textbooks and English language textbooks can be noticed in Table 4.1. The sentence from the social studies textbook has a simple relational sentence pattern: *X constitutes Y*, where *X* is a nominalized group (the destruction of rainforests) and *Y* is another nominalized group (a great loss of resources to humanity and science).

The sentence from the history textbook, likewise, has a simple sentence pattern: *X* made *Y* possible. However, *X* is an extremely complex nominalized group and it is made up of three subcomponents:

i. His decisive and farsighted acts in accepting the Truce of Villafranca,
ii. [his decisive and farsighted acts] in stopping Garibaldi from marching on to Rome,
iii. and [his decisive and farsighted acts] in allying with Bismarck (the repeated material in the square brackets has been elided without interfering with understanding).

The English language textbook sentences also have a simple sentence pattern:

X is/has/likes *Y*. However, the nouns/noun groups are relatively simple;
X → I, My name, We;
Y → Jennifer, lots of friends, reading magazines and going on Facebook.

One can imagine the huge disconnect that a student would feel encountering the kind of English sentences in the social studies and history subjects and the kind of English sentences in the English language subject. It seems that the English language subject is not helping a student to master the kind of English useful in content subjects. However, many content subject teachers look to the English language

Table 4.2 Common genres (text types) found in the English language and content subjects

Category	Example	Subject areas		
Information texts	Information reports Laboratory reports/experiments Descriptive reports Investigative reports Essays	English Social studies	Geography History Economics	Science
Recount texts	Historical recounts Biographical recounts Newspaper reports	English Social studies	Geography History	
Procedural texts	Directions Instructions Recipes Rules Manuals Agendas	English	Geography	Science Math
Explanation texts	Explanations on sequence/process Explanations on cause and effect	Social studies	Geography History Economics	Science
Persuasive texts	Expositions Discussions Advertisements Editorials	English Social studies	Geography History Economics	Science

teacher to address the language needs of their students and do not consider it their job to provide language support to students in their own academic content lessons.

Apart from the disconnect at the sentence level, there is a disconnect at the level of genres found in the content subjects and the English subject and very often few attempts are made to connect the kind of genres learnt in the English subject and those useful in content subjects. Table 4.2 shows a comparison of the different kinds of genres useful in English subjects and other content subjects. We can see that while there is some overlap between them (e.g. procedural texts, exposition texts, discussion texts), there is also a range of different genres not shared by English and other content subjects (e.g. email letters, narratives, film reviews vs. laboratory reports, explanation texts, information reports).

4.3 Disconnect Three: Pedagogical Disconnects

Apart from disconnects within the curriculum and across the curriculum, there is a further kind of disconnect which has to do with the usual kind of pedagogies practiced in content classrooms and the kind of pedagogies that is needed to enable students to produce appropriate writing in their assignments and assessments. While the within-curricular and across-curricular disconnects discussed above have to do with *what* to teach, the pedagogical disconnects discussed in this section have to do with *how* to teach.

To describe how teachers teach (or an enacted pedagogy) requires us to become familiar with a few analytical tools used in the classroom interaction analysis, the most important of which is the notion of the triadic discourse format (Sinclair and Coulthard 1975; Mehan 1979; Heap 1985; Lemke 1990; Lin 2007). The triadic discourse format is the most commonly found interaction pattern in all kinds of classrooms. It consists of three parts: initiation, response and feedback (IRF) (in some studies, the last part is termed evaluation, and thus IRE). For example, consider the following teacher–student IRF exchange in a math lesson:

T	Okay, so yesterday I've asked you to bring back something. What to bring in?	Initiation
S	Cylinder	Response
T	Yes, something in the shape of a cylinder. Yeah	Feedback

Notice that it is often the teacher who does the initiating, the student(s) who do(es) the responding and the teacher who gives the evaluation or feedback.

Freebody (2013) analyses an excerpt from a science lesson in which the teacher is going through a worksheet with his Grade 11 students in a science class:

64. T: ((reading)) 'glands that produce starch digesting enzymeˆ'

65. SC: salivary^{v}

66. T: salivary glandsˆ (.) good^{v} (3)

a. let's go round (.) so we don't just always have the same person answer (.)
b. thanks (.) thanks Caitlin (.) so Kateˆ the next oneˆ
c. ((reading)) 'part of the gut where faeces are formedˆ' (11)

67. SK: I don't know^{v}

68. T: not sureˆ (.) next one Patriciaˆ (3)

69. SP: umm (2)

70. T: where the faeces are formed (.) we know it's down here somewhere ((rubbing her stomach)) don't weˆ

71. SP: oh (.) the colonˆ=

72. C: = it's part of the large intestineˆ

73. T: OK^{v} (.) so y'all think it's the colonˆ (.) OKˆ that's fine (.) the colon^{v} (2) The next oneˆ um:m (1) Emilyˆ

74. SE: I have no idea

75. T: you have no ideaˆ (.) OK^{v}

a. you'll have more idea in a moment won't you (.)
b. so Leannev (.)
c. ((reading)) 'digested in stomach and small intestineˆ'

76. SL: proteins^

77. T: proteins^v

((lesson continues))

(From Freebody 2013, p. 67)

Many teachers will find this lesson excerpt familiar. It is a practice commonly found in the classrooms of many different subject areas. I have called this 'answer-checking practice' (Lin 1996, 2000). The whole point of this practice is to co-construct a corpus of certified true answers ('model answers') (Heap 1985) to a list of questions on a worksheet and the students are expected to be able to reproduce (parts of) this corpus of answers as 'knowledge' items in subsequent assessments or assignments. This kind of pedagogy is thus predisposed by the use of worksheets and exercises that do not require extended writing as answers (e.g. multiple-choice questions, fill in the blanks, matching, labelling). The teacher typically uses the triadic discourse format (IRF) to elicit candidate answers from students and then to certify some as acceptable and some as partial in the Feedback slot and through a reiterative use of these IRF speech exchanges, the teacher monitors the understanding of students and works some of the partial answers into acceptable answers.

Freebody makes a similar analysis of the excerpt in this science class as he observes, 'The knowing here is coproduced in and by the speech-exchange system' (2013, p. 68). And he points out that this knowing does not necessarily match the kind of knowing that students are required to display when the subsequent assignment or assessment goes beyond asking for just bits and pieces of (oral) information but rather asks for a written paragraph or essay. There is thus a disconnect between what counts as 'knowing' in the classroom and what counts as 'knowing' in subsequent formal school written assignments or assessments. Despite this disconnect, this practice has its local function of engaging the attention of a large group of students as any student can be called upon by the teacher to provide an answer at any time during this IRF interaction process. In many Asian classroom contexts where the class size tends to be large, this practice is especially pervasive.

Apart from this disconnect between what counts as a proper display of 'knowing' in the pedagogical set-up of the classroom and what counts as a proper display of 'knowing' in subsequent formal written assessment tasks, there is another frequent pedagogical practice that functions to help students to 'unpack' difficult academic topics and texts into everyday language and examples but falls short of helping students to 'repackage' or 'repack' these back into academic texts.

For example, a Secondary 2 (Grade 8) student is likely to encounter school texts with sentences like the following one (taken from a Secondary 2 integrated science textbook commonly used in English medium (EMI) schools in Hong Kong:

> Waste gases released by motor vehicles, power stations and factories are the main sources of air pollution in Hong Kong.

To 'unpack' academic language for students, a competent EMI teacher might typically transform (or translate) the sentence into everyday language that usually consists of the following ensemble of sentences delivered in an IRF classroom discourse format; such IRF exchanges function to engage students in talking about the text, to relate the textbook topic to students' daily life experience, and to get students interested in the topic:

T: Why do we have air pollution in Hong Kong? What are the things that pollute the air? What are the things that make the air dirty, making it smelly or bad for people? Can you give me some examples? What are the things that make the air bad and the bad air will make you sick?

S1/S2/S3: Factories! Cars! Smoking!

T: Yes, very good! Cars, factories, what else? What other things can you think of?

S4: Power companies!

T: Yes, very good! Power companies, power stations… So, let's look at the textbook, page 65, first paragraph, it says: *Waste gases released by motor vehicles, power stations and factories are the main sources of air pollution in Hong Kong*. So, now, you know the main sources of air pollution in Hong Kong, do you? The cars, the power stations and factories, they give out waste gases, dirty gases, and so these dirty gases pollute our air and make people sick, right?

The above-reconstructed classroom exchanges (based on many years of classroom observation) are readily recognizable by teachers as a common pedagogic strategy in rendering the school academic texts accessible and interesting to students. It illustrates how teachers are engaged in the linguistic, interactive processes of 'unpacking' academic texts for students in their daily teaching. When the students' English proficiency is very basic and even English paraphrasing (as shown above) might not help the unpacking of academic texts, the teacher might draw on L1/local language resources to assist with the unpacking process as shown in the reconstructed dialogue below (English translations of the Cantonese utterances are placed in pointed brackets immediately after the utterances):

T: Why do we have air pollution in Hong Kong?

Ss: [no response]

T: [slowly] So, why do we have air pollution in Hong Kong? What are the things that pollute the air?

Ss: [no response]

T: Air pollution, 咩係 <what is> air pollution呀 <question particle>?

S1: 空氣<air>…

T: 空氣咩呢<air what>?

S2: 空氣污染<air pollution>!

T: Yes,空氣污染<air pollution>,即係<that is>air pollution。咁點解會有<so why is there>air pollution呢<question particle>? 咩野會做成<what will lead to> air pollution呢<question particle>?個<the> source係咩呢<is what>?

S3: 汽車D廢氣<cars' waste gas>!

T: 係喇<yes>,汽車D廢氣係其中一個源頭<cars' waste gas is one of the sources>,其中一個<one of the>source。仲有D咩<what are the other> sources呢<question particle>?

S4: 工廠D廢氣… 車D廢氣… 食煙… <factories' waste gas… cars' waste gas… smoking…>

T: 工廠D廢氣點用英文講<factories' waste gas, how to say it in English>? 工廠係<factory is>…

S4: Factory!

T: 係喇<yes>, factory。咁廢氣呢<then how about waste gas>?

S5: air…

T: No, not air. 廢氣唔係叫做<waste gas is not called> air,係<it's>waste gases。Waste gases, 即係廢氣<that is waste gases>。

S5: 哦 (Yes)…

T: 哦 (Yes), 咁即係咩呢<so, what does that mean>? 除咗<apart from>waste gases,仲有咩野其他源頭呀<what are the other sources>?

S6: 空氣污染嘅源頭有汽車D廢氣、工廠D廢氣同食煙D廢氣<The sources of air pollution are car waste gas, factory waste gas and smoking's waste gas> 。

T: Right. Any other sources?… No? No other sources? 無其他源頭嗱<No other sources>? OK, so, let's look at the textbook, page 65, first paragraph, it says: *Waste gases released by motor vehicles, power stations and factories are the main sources of air pollution in Hong Kong*. 嗱,睇吓呢句<Okay, look at this sentence> *Waste gases released by motor vehicles, power stations and factories*... motor vehicles 同<and>factories你地都講啱咗<you are all correct about>,但無講到<but you haven't talked about> power stations喎<still>。咁咩係<So, what are>power stations呀<question particle>? What is a power station?

S7: 係地鐵站<It's subway station>!

T: 唔係地鐵站<It's not subway station>,地鐵站係<subway station is> MTR station,你答啱一半啫<You're only half correct>。咩係<What is>power station呀<question particle>? 仲有D咩<Are there any other> station呀<question particle>? 唔係車站呀吓<Remember it's not a train station>?

S7: 發電站<Power station>!

T: 係喇<Yes>,right! 係發電站<It's power station>。Very good! Power station就即係發電站喇<is power station>。咁究竟咩野會做成<So, what will lead to> air pollution嘅sources呢<air pollution's sources>? Look at the textbook again, *Waste gases released by motor vehicles, power stations and factories are the main sources of air pollution in Hong Kong*. So now you know the meaning of this sentence, right? Now you know the main sources of air pollution in Hong Kong, do you? The cars, the power stations and factories, they give out waste gases, dirty gases, and so these dirty gases pollute our air and make people sick, right? 咁呢D空氣污染嘅源頭就整到我地病喇 <So, these air pollution sources make us sick>…

In the above-reconstructed classroom exchanges, I illustrate how the teacher uses both L1 everyday language and examples and L1 formal technical language (e.g. waste gases, sources of air pollution) to unpack the L2 academic text for his students. Teachers can also enhance their ability of unpacking science texts for

students using visuals (Kress et al. 2001) and graphic organizers (more on this in Chap. 5). While this pedagogical practice can help students to access the content of the academic subject, it cannot help students to 'repack' this content back in an acceptable academic written form for subsequent formal assignments and assessments. In this context, Maton's (2013, 2014) Legitimation Code Theory (LCT), which is being widely used in research and teaching, provides very useful insights. From LCT the terms 'semantic gravity' and 'semantic density' capture well the pedagogical pattern often found in a content classroom. According to Maton (2013):

> ***semantic gravity*** (SG) refers to the degree to which meaning relates to its context. Semantic gravity may be relatively stronger (+) or weaker (−) along a continuum of strengths. The stronger the semantic gravity (SG+), the more meaning is dependent on its context; the weaker the gravity (SG−), the less dependent meaning is on its context. …
>
> ***semantic density*** (SD) refers to the degree of condensation of meaning within socio-cultural practices whether these comprise symbols, terms, concepts, phrases, expressions, gestures, clothing, etc. Semantic density may be relatively stronger (+) or weaker (−) along a continuum of strengths. The stronger the semantic density (SD+), the more meanings are condensed within practices; the weaker the semantic density (SD−), the less meanings are condensed. (Maton 2013, p. 11)

In a sense, SG and SD can be seen as a much more technical and abstract theoretical modelling of a cluster of phenomena which have been loosely characterized by the terms of BICS and CALP by Jim Cummins (see Chap. 2). BICS can be said to represent the minus end of SD while CALP represents the plus end of SD. Likewise, Jim Cummins' notion of context embeddedness can be said to represent the plus end of SG. Figure 4.3 shows the inverse relationship of SD and SG; that is, the higher the SG (the greater the contextualization), the lower the SD (the less dense the information content that is packed into the language—BICS), and vice versa.

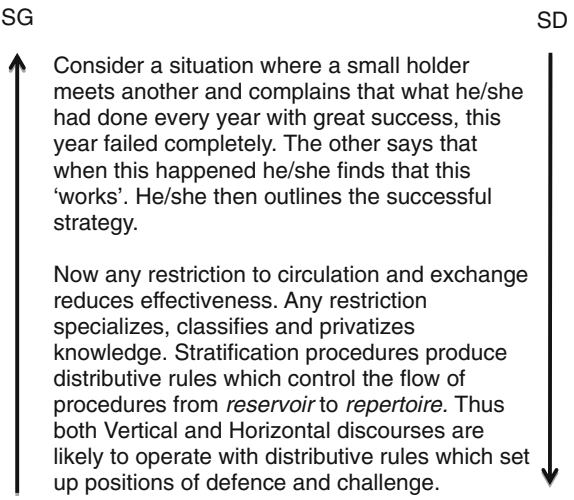


Fig. 4.3 The inverse relationship between semantic gravity and semantic density (from Martin 2012, Slide 61; reproduced here by permission of Professor Jim Martin)

SG and SD are variables that are quantifiable and representable in charts and graphs (Maton 2013, 2014). Based on these concepts, a 'semantic profile' (Maton 2013, 2014) can be charted out to represent SG and SD in relation to the temporal progression of the lesson and the pedagogical functions of 'unpacking' and 'repacking'. Figure 4.4 below shows an example of a 'semantic wave' (which is one kind of semantic profile) in relation to lesson progress.

To illustrate how a semantic profile can help us capture what is happening in the classroom, let us look at the lesson excerpt provided by Maton (2013, p. 15); the teacher is explaining the technical term 'cilia':

> **T**: Okay B (student's name) what are the 'cilia'. What was it? No? A (student's name) do you know what cilia is? No? D? Someone must know what they are…
>
> **Sf**: Hairs
>
> **Sm**: The little hairs?
>
> **T**: The little hairs. And basically, they beat in an upward motion from inside your body out through to your nose. [Teacher is waving arms up]. So, they beat up and they take the pathogens away with them. And, guys, I don't know if I've ever told you this but when you smoke cigarettes, the tar actually causes your cilia to, because it's so heavy, to drop, and so your cilia don't work probably after that because they're too heavy they've dropped, so they can't beat the pathogens out of your body! So that's one of the reasons that smoking's bad as well. Okay! Alright write this down under description!

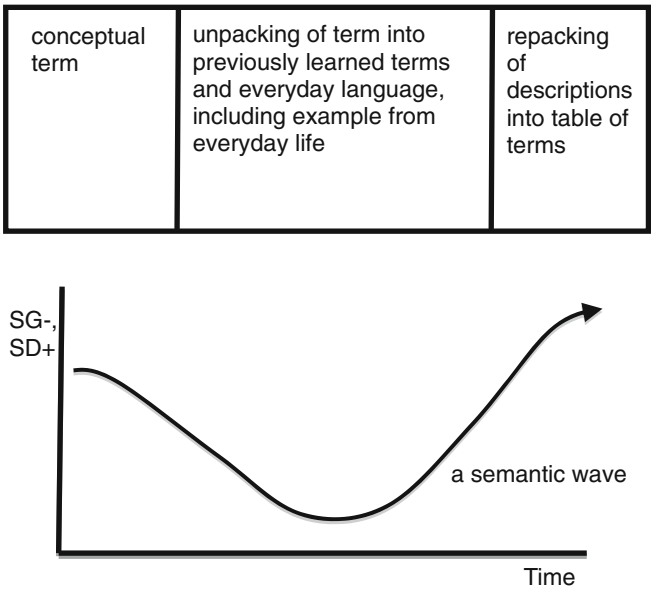


Fig. 4.4 A semantic wave in relation to pedagogical functions of unpacking and repacking (reproduced by permission of Professor Karl Maton; www.legitimationcodetheory.com)

And then, the teacher writes on the board:

Cilia	Hair-like projections from cells lining the air passages	Move with a wavelike motion to move pathogens from the lungs until it can be swallowed into the acid of the stomach

Maton (2013, p. 15)

A semantic wave (which is one kind of semantic profile) thus captures well the different phases of the lesson where semantically dense academic content (and language) is unpacked into everyday language and examples, which are then repacked into semantically dense academic language, as the teacher writes the dense language on the board (as shown above). This pattern (i.e. a semantic wave) is, however, rarely found in lessons as teachers usually just unpack technical terms for their students without helping students to repack everyday language into technical language again. It seems that a lot of theoretical and pedagogical mileage can be gained from the LCT concepts (semantic gravity, semantic density, semantic profiles), as opposed to the less technical and less precise notions of BICS and CALP even though initially BICS and CALP might be terms more easily accessible to teachers. A lot of educational research has been done using the LCT concepts (For more information on LCT and application of LCT concepts in research studies on teaching, please visit the LCT website—http://www.legitimationcodetheory.com/ and the LCT research forum—https://groups.yahoo.com/neo/groups/LCTheory/info.

To summarize the above discussion, it is important to have both unpacking and repacking phases systematically built into the pedagogical process of teaching a topic. More often than not, however, there is only an unpacking phase but not a corresponding repacking phase, with the teacher helping students to comprehend the semantically dense academic language but *not* helping them to produce a similar kind of language—hence a pedagogical disconnect.

4.4 Disconnect Four: Disconnects Among Different Research Traditions

The last kind of disconnect is that between different research traditions bearing on the theory and practice of LAC, academic literacies and CLIL. Here, I want to outline three very important traditions and show how the relative lack of cross-fertilization among these traditions is not helping the development of sound theory and practice in LAC, academic literacies and CLIL.

The first tradition is the English for Specific Purposes/English for Academic Purposes (ESP/EAP) research tradition on academic writing. It is strong on analysis

of the structure of specific genres, especially in the analysis of academic research articles (RA) at tertiary level. The ESP/EAP focuses on postsecondary/tertiary levels and the adult learners in academic and professional settings, for example, the ESL international students learning how to do English academic writing for their different disciplines in the university in North America or different parts of the world. The second tradition is the Sydney School genre-based pedagogy, which is derived from systemic functional linguistics (SFL) which focuses on analysis of language as systems of semiotic resources for making meaning and construing reality in context. This tradition is strong in both macro, top-down analysis of the schematic structure of academic genres, and micro, bottom-up analysis of lexico-grammatical features of academic language. This tradition has focused on developing theoretical and pedagogical frameworks for guiding and understanding the teaching and learning of academic genres by both L1 and ESL/indigenous students in the schools in Australia and many parts of the world. The third tradition is the New Rhetoric School based in the US Genre scholars in the New Rhetoric School focus on the 'situational contexts in which genres occur than on their forms and have placed special emphases on the social purposes, or actions, that these genres fulfil within these situations' (e.g. Bazerman 1994; Coe 1994; Devitt 1993; Freedman and Medway 1994). Like the ESP/EAP tradition, their work mainly focuses on postsecondary-/tertiary-level students. This school has originated from the important body of North American scholarship concerned with rhetoric and compositional studies mostly in L1 English teaching in the university (known as English composition courses).

One can say there is a neat division of labour among these three traditions: e.g. the ESP/EAP and New Rhetoric School focus mainly on tertiary levels and the Sydney School focuses mainly on primary and secondary school levels. However, the relative lack of mutual illumination and crossover has not helped the development of theory and practice pertinent to the work of LAC, academic literacies and CLIL. For instance, the very notion of genre is defined (slightly) differently under these three traditions and the terminologies used in genre analysis differ from one another. Furthermore, they have different emphases in their pedagogical recommendations. For instance, while the New Rhetoric School recommends against explicit teaching of genres, both ESP/EAP and the Sydney School affirm the benefits of explicit teaching of genres. This said, the past few years have witnessed encouraging signs of interactions among the three traditions (e.g. In Ottawa in 2012, there was a genre studies conference attended by key scholars from all three traditions).

In this chapter, four major disconnects which have implications for LAC, academic literacies and CLIL researchers and practitioners were outlined. In the next three chapters, these disconnects will be revisited and possible strategies to overcome each of them will be proposed and discussed with examples.

For copyright issues, these sentences have undergone some modifications.

Chapter Summary Points

- Intracurricular disconnects: vertical disconnects, horizontal disconnects,
- Intercurricular disconnects,
- Pedagogical disconnects,
- Genres across the curriculum,
- Different research traditions: ESP/EAP, Sydney School genre-based pedagogy, New Rhetoric School.

End-of-Chapter Discussion Questions

1. Can you summarize all the subcategories of the four different kinds of disconnects that have been identified in this chapter? To what extent do you agree with them, and is there any other disconnecting problem in bilingual education that you have found worth noting? Before proceeding to the next chapter, do you think there can be some strategies to tackle some of these problems posed by the author?
2. Why is the triadic 'answer-checking' practice commonly found in classrooms? How can the teacher make what counts as 'knowing' in the classroom match the 'knowing' expected of students in the assignment and assessment tasks through everyday classroom interaction?
3. Record one of your lessons and try to analyse a small episode of it. Is the classroom interaction taking place in the common triadic IRF discourse format? Does it work effectively? If yes, why so? If not, how can you improve it?

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