

## Chapter 5

# Curriculum Mapping and Bridging Pedagogies

### *Chapter Overview*

In this chapter, the curricular and pedagogical disconnects identified in Chap. 4 will be addressed through a discussion of some possible ways of doing curriculum mapping and bridging pedagogy in LAC and CLIL contexts. The focus will be on how content teachers and language teachers can collaborate to conduct needs analysis and systematic planning of the curriculum and pedagogy to address the needs identified.

## 5.1 Identifying the Language Demands of Academic Subjects

To overcome the intra- and intercurricular disconnects identified in Chap. 4, teachers and curriculum planners need to identify the language demands of different academic subjects and conduct both horizontal and vertical curriculum mappings of the language needs of students both within an academic subject and across different subjects. While this might sound like a straightforward task, accomplishment of this task requires expertise in both the academic subject areas and the linguistic analysis of academic genres and texts. In fact, not only language teachers but also content teachers need to have ‘knowledge about language’ and learn to use ‘visible pedagogy’ with ‘cultural sensitivity’ for them to be effective teachers helping students to master content in an L2 or in English as an additional language (EAL). ‘Knowledge about language’, ‘visible pedagogy’ and ‘cultural sensitivity’ are among the key principles informing learning in Teaching English to Speakers of Other Languages (TESOL) and EAL contexts, as Mahboob and Tilakaratna point out in the *TESOL White Paper* released by the TESOL International Organization in 2012. This

places a high demand on the content teacher to understand the language demands of their own subjects. Likewise, language teachers need to become more ‘knowledge aware’—e.g. to be aware of the specific language features, styles and registers used in different academic disciplines. Helping EAL students to cope with learning content in an L2 thus requires close collaboration between content teachers and language teachers. As Gibbons (2009) puts it:

In summary, effective learning environments for English language learners requires the following conditions:

- Teachers understand the language demands of their own subject (or of the content areas they teach) and are aware of how language is used in the subject.
- Subject content and language are authentically integrated in a well-designed and academically rigorous programme.
- Teachers are aware of the best conditions under which a second language is learned.
- Teachers hold high expectations of what is possible.
- Teachers know a range of language-based strategies that provide support for English language learners (Gibbons 2009, p. 153)

In the same vein, Derewianka (2011) summarizes three core principles of genre-based pedagogy; to her, genre-based pedagogy:

- identifies the language demands of the various curriculum areas;
- explicitly teaches students the genres needed for success in schooling;
- is concerned with deep learning of content together with learning the language of the content area. (Derewianka 2011: p. 1)

The key words which capture the above guiding principles are: *awareness of language demands, authentic integration of content and language, high expectations and high support, designing explicit and visible pedagogy*. Both content teachers and language teachers can further elaborate these principles with the common meta-language and theoretical framework provided by the Genre Egg (see Chap. 3, Fig. 3.4). Below I shall organize the discussion of LAC/CLIL curriculum mapping along the above guiding principles together with the meta-linguistic resources provided by the Genre Egg.

### ***5.1.1 Identifying and Mapping the Language Demands of an Academic Unit of Work***

The phrase ‘language demands’ is actually a shorthand to encompass the multiple layers and systems of language resources (e.g. as visualized in the Genre Egg) ranging from genre schematic structuring (e.g. stages and phases in an explanation text), to language functions (e.g. expressing cause and effect), to lexico-grammatical resources (e.g. nominalization) that students need to master in order to participate successfully in a diverse range of academic learning tasks and activities as confident speakers, listeners, readers and writers. Figure 5.1 shows Derewianka’s (1990) mapping of the language demands of different learning

activities (entailed by different student roles/identities) in a 3-week unit of work in the subject area of geology in a class of Grade 2 Australian children (Derewianka 1990, p. 201). In the innermost circle, the key vocabulary necessary for the children to build their knowledge of geology in this unit is listed, moving students from everyday common-sense words to the discipline-specific technical words which are organized into different taxonomies (i.e. building the ‘field’). In the middle circle of Fig. 5.1, the role relationships (‘tenor’) between teacher and students are mapped out, moving students gradually from the everyday role of ‘rock collectors’ to the more discipline-specific roles of observers, recorders, researchers, scientists and authors, while the teacher’s roles shift among coexplorer, coordinator, demonstrator-expert, consultant and so on. In the outermost circle, the different

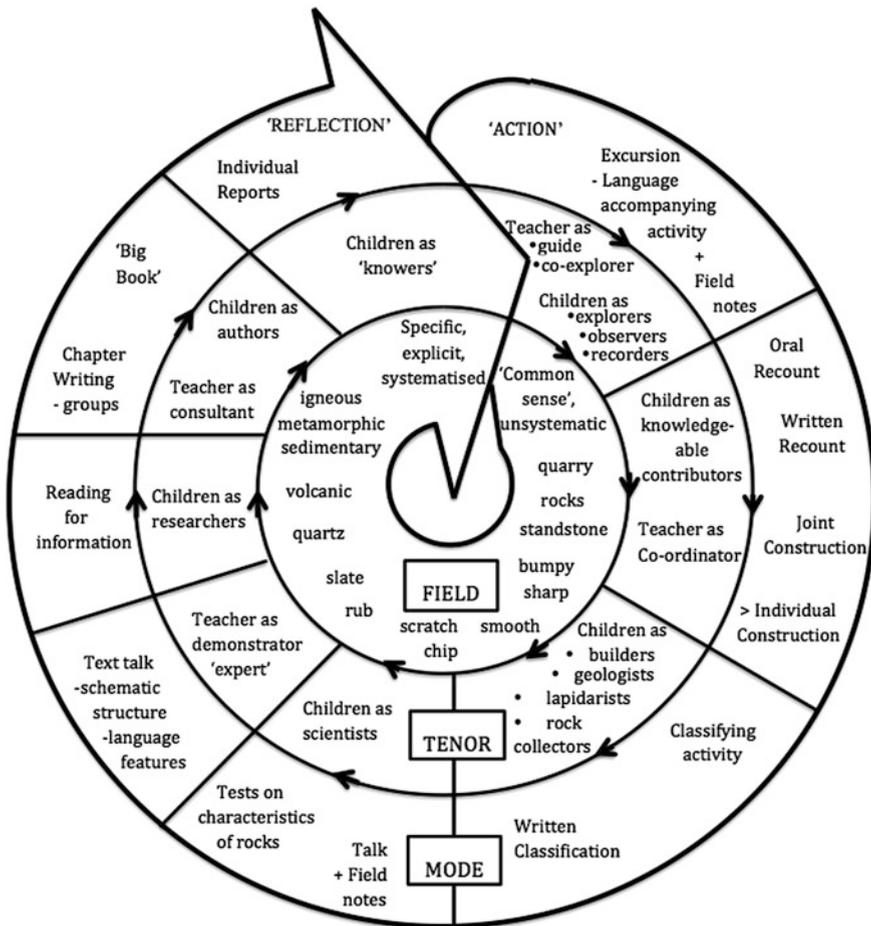


Fig. 5.1 Mapping the language demands of a unit of work in geology (From Derewianka 1990, p. 201, Fig. 12.2 ‘Diagrammatic description of a 3-week unit of work’; reproduced by permission of Dr. Beverly Derewianka and John Murray Press, an imprint of Hodder and Stoughton)

modes of communication are mapped out, moving students gradually along the mode continuum of field notes, oral and written recounts to more formal academic genres such as information report.

The strength of Derewianka's (1990) approach lies in seeing students as active agents of learning taking up different roles and identities (e.g. as explorers, observers, recorders, knowledge contributors, researchers and authors) under the guidance of teachers. Content learning is seen as accomplished *not* by rote memorization of 'model answers' given out by teachers in the worksheet answer-checking practice that frequently characterizes classrooms, especially in East Asian contexts where examination pressure tends to drive teaching and learning practices. Rather, learning is seen as accomplished largely through guided interactions with teachers and peers in the context of shared experience (Painter 1996, 1999; Rose and Martin 2012).

Using the Genre Egg framework (see Chap. 3) to identify the language demands of this unit of work, we can map out the key language resources that students need to master in order to successfully take up the different student roles and identities in the unit of work. For instance, using a table like Table 5.1, we can plan the different important elements in a unit of work in geology. Table 5.1 presents a unit plan specifying the content learning goals, teaching and learning activities, student roles and identities, key vocabulary, language functions and language patterns useful in realizing these functions, as well as the genres students need to understand and produce when doing the activities in this unit. With a table like this, teachers and curriculum designers can ensure that both the content learning and language learning aspects of a unit of work will be considered in the process of lesson planning.

Using a similar approach, content teachers/specialists and language teachers/specialists can collaborate in curriculum design and planning to overcome the curricular disconnects discussed in Chap. 4. For example, using the above

**Table 5.1** LAC/CLIL curriculum mapping for a unit of work in geology

Content learning goals/topics	Classification of rocks
Teaching/learning activities (TLAs)	Observing and recording; hammering test; classifying activity
Student roles/identities	Rock collector; scientist; observer, reporter, experimenter, classifier
Key vocab	Quartz, volcanic, sedimentary, metaphoric, igneous rocks
Language functions (+language patterns realizing them)	Comparing and contrasting (e.g. 'Igneous rock is hard while sedimentary rock is soft.');
	classifying (e.g. 'Scientists group rocks into three main types: igneous, sedimentary and metaphoric.');
	exemplifying (e.g. 'Marble is an example of metaphoric rock.');
	defining (e.g. 'Metaphoric rocks are rocks which have been changed by heat and pressure.');
	'Rocks that have been changed by heat and pressure are called metaphoric rocks.')
Genres (understand + produce)	Field notes, oral recount, written recount, 'big book' (information report on different kinds of rocks)

approach we can do curriculum mapping for a unit of work on how to design a ‘fair test’ in Grade 7 science. ‘Fair test’ is an important topic in the junior secondary science curriculum. A ‘fair test’ is a difficult technical concept for many students as it is not what we are used to doing in our everyday common-sense world. A ‘fair test’ is a test carried out under ‘fair conditions’. For example, if the aim of the experiment is to test the hypothesis that a bigger candle gives a hotter flame and thus heats up water faster, then in the experiment the ‘independent variable’ is the size of the candle, and the ‘dependent variables’ are the temperature of the flame and the time needed to heat up water. To test this hypothesis, the experiment must be conducted under a set of ‘fair’ conditions. These include ensuring that possible ‘intervening variables’ such as the amount of water will be kept the same (the technical phrase is ‘kept constant’). Using a table like Table 5.2, the science teacher and the language teacher can collaborate and work together to plan a unit of work on how to conduct a fair test. Table 5.2 lists out all the important content learning and language learning aspects of this unit of work. These aspects include the content learning goal (how to design a fair test), the teaching and learning activities (e.g. evaluating an experimental design and redesigning an experiment), student roles/identities (e.g. as an observer, recorder, hypothesizer, evaluator and experiment redesigner), key vocabulary (e.g. fair test, independent variable, dependent variable and controlled variables), language functions and language patterns to realize them (e.g. hypothesizing, giving instructions and evaluating) and the target genres to understand and produce during the teaching and learning activities (e.g. graphic organizers, data logging tables and procedural texts). With a curriculum mapping table like that in Tables 5.1 and 5.2, content teachers and language teachers can have a common tool to identify the language demands of the content learning on the one hand, and to systematically design and build language support into the content lesson on the other.

The two experimental redesign tasks developed by a science teacher (Ms. Cheung) in this unit of work in a Hong Kong school are shown in Figs. 5.2 and 5.3. In Fig. 5.2, the teacher first sets out a scenario with a story figure (Jay) in a short paragraph and then presents a hypothesis in a sentence (‘He thinks that a bigger

**Table 5.2** LAC/CLIL curriculum mapping for a unit of work in Grade 7 integrated science

Content learning goals/topics	How to design a ‘fair test’
Teaching/learning activities	Evaluating an experimental design; redesigning an experiment: ‘burning candles’, ‘tissue absorption’
Student roles/identities	Scientist: experimenter, observer, recorder, hypothesizer, evaluator, experiment re-/designer
Key vocab	Fair test, independent variable, dependent variable, controlled variables (variables to be kept constant)
Language functions (+language patterns realizing them)	Hypothesizing; giving instructions; comparing and contrasting; expressing cause and effect; evaluating
Genres (understand + produce)	Using a graphic organizer (to show the relationships of the key elements in a fair test); using a graph/table to record and visualize observed experimental results

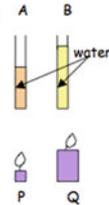
Light up my life !!

Jay finds that burning candles gives out heat (熱). He wonders whether the size of the candles affects the temperature of the flames. So he does an investigation on it.

He thinks that a bigger candle gives a hotter flame.



Add some water into 2 boiling tubes A and B.  
 Measure the temperature of the water in both tubes.  
 Use a smaller candle to heat tube A.  
 Use a bigger candle to heat tube B.  
 Measure the temperature of the water in both tubes after heating for 5 minutes.  
 The temperature of water rises 10°C in tube A and 8°C in tube B respectively.



Jay told his science teacher that a bigger candle did not give a hotter flame. Jay's teacher told him that there were some mistakes in the experiment.

1. Do you agree with his teacher?  
\_\_\_\_\_
2. If yes, state the mistakes.  
\_\_\_\_\_  
\_\_\_\_\_
3. Improve(改進) the experimental design of the investigation.

**Aim:** To show that a bigger candle gives a hotter flame.

**Material:** \_\_\_\_\_  
\_\_\_\_\_

**Procedure:**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Observation and result:**

**Conclusion:** \_\_\_\_\_

Fig. 5.2 Experiment redesign task: burning candles (reproduced by permission of Ms. CHEUNG Tung-ping, Munsang College, Kowloon, Hong Kong)

**Fig. 5.3** Experiment redesign task: Tissue paper absorption (reproduced by permission of Ms. CHEUNG Tung-ping, Munsang College, Kowloon, Hong Kong)

King Kow Tissue Paper !!

The advertisement(廣告) of King Kow Tissue Paper says,

King Kow is soft!  
King Kow is strong!  
King Kow absorbs the most!



Sally wonders whether King Kow Tissue Paper can really absorb more water than the other tissue paper. She carries out an investigation on it.




Add some water in a measuring cylinder.  
Record the amount of water in the cylinder (V1).  
Put a piece of K.K. Tissue Paper into the water of the measuring cylinder.  
Pick up the wet tissue paper and transfer it into a beaker.  
Record the amount of the remaining water in the cylinder(V2).

The cylinder loses  $V1 - V2 = 6\text{mL}$  of water.

So she told her teacher that K.K. Tissue absorbed more water than the others. Sally's science teacher told her that the experiment *could not support* the conclusion.

1. Do you agree with her teacher?  
\_\_\_\_\_
2. Explain the reason(s).  
\_\_\_\_\_  
\_\_\_\_\_

3. Improving(改進) the experimental design of the investigation.



**Task:** To show that King Kow Tissue Paper absorbs more water than the others.

**Material:** \_\_\_\_\_  
\_\_\_\_\_

**Procedure:**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Observation and result:** \_\_\_\_\_

**Conclusion:** \_\_\_\_\_

candle gives a hotter flame’). We notice that she has modified the science experimental design genre a bit to make it more interesting to the students to start with as it now resembles the daily life genres of stories and recounts. We also notice that the teacher has provided a Chinese (students’ L1) translation of the L2 English term ‘heat’ in brackets to assist the students in grasping the meaning of this key term. Then the experimental procedure is provided using a list of imperative sentences. Alongside the linguistic text, the teacher uses attractive visuals (e.g. images of candles and test tubes) both to increase the interest level of the task and to illustrate some of the key information communicated in the linguistic text. The experimental procedure has some built-in errors so that this test is not a ‘fair test’. The story scenario continues by having Jay’s teacher telling Jay that his experiment has some mistakes in it. Then Ms. Cheung’s students are invited to express their views and analysis in short-sentence responses. (‘Do you agree with his teacher?’ ‘If yes, state the mistakes.’) Following this, Ms. Cheung’s students are invited to suggest ways to improve the experimental design of the investigation. In both tasksheets (see Figs. 5.2 and 5.3), we can see that the teacher provides ample language support to her students by having the genre structure of an experiment design clearly laid out for the students (like a writing template). There are five stages in the experiment design genre and each is shown under a clear heading in the tasksheets provided to the students to scaffold their rewriting of the experimental design: Aim, Material, Procedure, Observation and Result, Conclusion. In the design of these tasksheets, we can see that the science teacher, Ms. Cheung, has deliberately integrated language support into this task: students are assisted by the teacher and the tasksheets in completing the science experimental redesign writing task using the appropriate genre stages and key vocabulary provided in the tasksheets. For example, Jay’s procedure is faulty only in terms of its content logic; it nonetheless contains the key vocabulary and appropriate sentence patterns (e.g. imperative sentences starting with action verbs, ‘Add...’, ‘Measure...’) for students to rewrite the experimental procedural steps. Students doing the experimental redesign writing task can easily borrow these language patterns and use them in their own writing in the new experimental design. In Fig. 5.3, a different story scenario with a different character, Sally, is used to contextualize the science experimental redesign task in an appealing story-like context. The task structure is parallel to that in Fig. 5.1. It is a parallel task used by Ms. Cheung to provide more practice to her students to experience how a non-fair test can be redesigned to make it a fair test. We notice that although both tasksheets start with a story-like scenario, the ultimate writing that the students need to produce is in the more formal science experimental design genre. In this way, we see how Ms. Cheung provides ample language support to her students as they move from a more everyday life genre (story, recount) to a more formal school genre (experimental design).

Doing curriculum mapping on units of work covering the whole subject curriculum for the same year level and across different year levels takes a lot of time and analysis and most important of all, continuous discussion and collaboration of both subject specialists and language specialists. However, the pay-offs are definitely worth the effort as such horizontal and vertical curriculum mapping will help

increase both content and language teachers' awareness of the diverse range of language and cognitive demands of different curricular activities and tasks in the student's learning trajectory across the years spanning different subjects. Curriculum planners and teachers can ensure that similar language/cognitive demands are recycled progressively in a curriculum spiral to reinforce and consolidate different kinds of language functions, genres and academic vocabulary in the different academic subject curriculums as well as the language curriculums at the same year level and across different year levels. For instance, Table 5.3 shows the collaborative curriculum mapping done by Ms. Cheung (Science teacher) and Mr. Kan (English teacher) out of their own initiative prior to their contact with the researchers. Ms. Cheung (a science teacher) and Mr. Kan (an English teacher) collaborated in their school to provide students with language support for their science learning in the students' L2, English. They sat down together and discussed the ways in which the topics taught in the integrated science (I.S.) lessons by Ms. Cheung could be coordinated with the topics taught in the English language lessons by Mr. Kan across two school years (Secondary 1 and Secondary 2; equivalent to Grade 7 and Grade 8). They came up with a curriculum mapping table (see Table 5.3).

In the left column of their curriculum mapping table under 'Topics' are listed topics selected by both teachers as the topics under which both teachers can provide coordinated support to students in their respective lessons. In the column under 'integrated science subject' are listed the subtopics and activities that Ms. Cheung will engage students in under the main topic. In the column under 'English language subject' are listed the subtopics and activities that Mr. Kan will engage students in under the same main topic as Ms. Cheung's. And these two teachers synchronize the teaching of these topics so that for example when Ms. Cheung is teaching students to do experiments on 'burning candles' and 'melting ice' under the main topic of 'Observation', Mr. Kan will be engaging the same students (in his English language lessons) in observation activities that involve using the five senses. Language arts activities that engage students in observing and describing their family members will be used. Other English language resources such as those useful for doing quantitative and qualitative data descriptions are introduced. Some language resources useful in describing different stages (e.g. before, during and after the change) are also introduced.

When the researchers (my colleagues and myself) first came into contact of Ms. Cheung and Mr. Kan's work in 2010, we were impressed by the amount of LAC work that they had already been doing. We also found in their experience an interesting example of the benefits of mapping the language and cognitive demands of different activities and tasks. Ms. Cheung found that many students in her Secondary 2 (Grade 8) I.S. class had difficulty using the Particle Theory to explain an observed phenomenon (e.g. 'When water is heated, it expands. It is because the water particles...'). She thus discussed with Mr. Kan, the English teacher teaching the English language subject to the same class of students. Mr. Kan subsequently included in his curriculum plan a topic on using an 'internal' theory (about someone's feelings) to explain an external, observed event (e.g. 'When he is hit, he

**Table 5.3** An example of some initial cross-curricular mapping across junior secondary integrated science and English language subjects

	Topics	Integrated science subject		English language subject	
Sec 1	Observation	Burning candle Melting ice		Observation activities—use 5 senses, Composition (my family) Quantitative & qualitative In stages (before, during, after the change)	
	Procedure writing	Imperatives • Diagram → sentences • Quizzes • Write laboratory reports (same theme) • Rewrite laboratory reports		Imperatives— Diagram → sentences Quizzes Cooking recipe Running nose Linking words (Sequencing) —firstly, secondly, then, lastly, ...	
	Result and discussion	Result—description, table, graph Discussion—evaluation and reflection		Tenses Fact—present tense Result and reflection—past tense Evaluation and improvement—future tense Modal verbs Evaluation and improvement (could, might, would, should, ...)	
	Hypothesis and conclusion	Writing the task, aim, conclusion		Sentence pattern and passive voice	
	Cause and effect	External	Internal	External	Internal
		When water is heated, it expands	Particle theory	When he is hit, he cries.	Feeling
Concept map	Reading articles—concept map, flow chart		Reading articles—concept map Comprehension		
Sec 2	Observation	Gases test Acid—egg in vinegar Space travel—film show (Apollo 13)		Revision—quantitative and qualitative In stages Describe a person and a scene Adjectives Use of dictionary and thesaurus	
	Comparative (learning skill)	Learning a new concept Compare 2 concepts (similarities, differences) Oxygen, Carbon dioxide Burning, respiration, Breathing, respiration, Respiration, photosynthesis		Comparative	

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cries. It is because he feels sad when...'). Students can thus experience using a similar cognitive/linguistic function (i.e. using a theory to explain an observed event) in both the I.S. subject and the English language subject. These findings are grounded in the close collaboration between the content teacher and the language teacher and will be beneficial to the students. If each teacher works alone with the students without this sharing of their observations of students' needs, then there will not be these concerted curricular and pedagogical efforts in helping the students to tackle the academic task of explaining an observed phenomenon in an experiment. The science teacher will be tackling this alone while the English teacher will not be aware of the cross-curricular language needs of the students.

### *Application Scenario 5.1*

In Table 5.3, we see some initial work by Ms. Cheung (Science teacher) and Mr. Kan (English language teacher) on mapping the curricular topics and language demands across the I.S. subject and the English subject. Can you take one item (e.g. comparative) from the table and elaborate the cross-curricular mapping between I.S. and English using the Gene Egg as a framework to bring out the language demands in more detail. You can use a similar curriculum mapping approach as illustrated in Table 5.1.

## 5.2 The Teaching/Learning Cycle

Identifying the language demands of different academic subjects and doing curriculum mapping can help us address the question of *what* to teach; however, we still need to address the question of *how* to teach. For instance, we need to design scaffolding pedagogies to explicitly teach the genres and the language resources useful for participation in the teaching and learning activities in different subject areas. In this section, I shall introduce the scaffolding pedagogy called the teaching/learning cycle (TLC) (Rothery 1994; Rose and Martin 2012).

Figure 5.4 shows Rothery's (1994) original conceptualization of the TLC. The TLC is built on the pedagogical principle that teachers should prepare students for the academic reading and writing tasks *before* asking them to do these tasks on their own. This is especially important in the light of the pedagogical disconnects discussed in Chap. 3: e.g. typically, students are asked to do a writing task in an academic subject without adequate prior preparation. For instance, in the science, history, geography or social studies curriculums at senior secondary levels, students are required to write descriptive, explanation, expository or discussion texts in order to answer examination questions (see Sect. 4.1 in Chap. 4; see also Task 1).

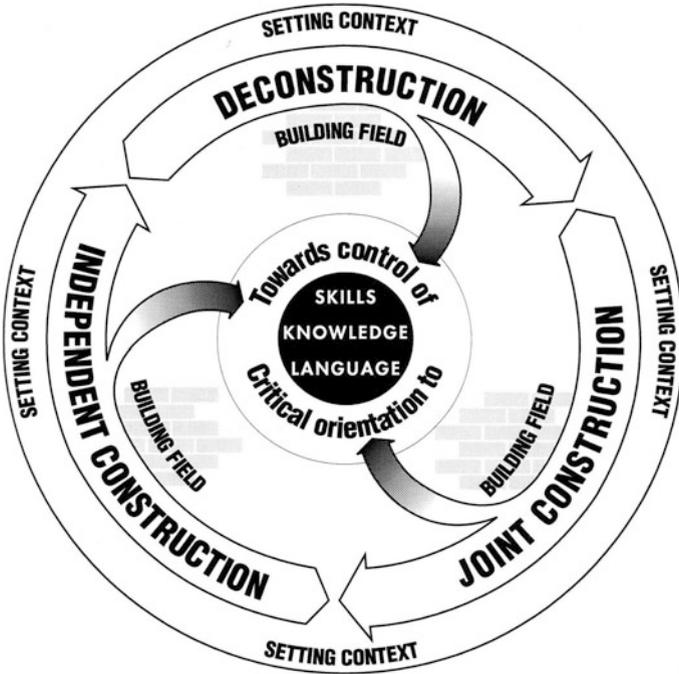


Fig. 5.4 Teaching/learning cycle (Image from Martin and Matthiessen 2014, Fig. 9.6, p. 149; reproduced by permission of Springer)

**Task 1 (for Grade 7 students)**



Explain why the candle goes out.

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In order to prepare students for successful communication in these academic genres (e.g. explanation texts and expository texts), the TLC would prove useful as it adequately prepares students for a writing task through three successive stages:

1. Teacher modelling a text (joint deconstruction and analysis of a text),
2. Teacher–student jointly constructing a text and
3. Student independently constructing a text.

Teaching can start at any one of these stages, and whichever stage is introduced first the teacher should offer maximum scaffolding to the students. Gradually there should be a shift of responsibility from teacher support (e.g. joint construction) to learners taking responsibility for their own learning (e.g. independent construction). In many LAC/CLIL contexts, where students are learning English as a foreign (EFL) or additional language (EAL) and are using it as the medium for learning content, there needs to be even greater support in the modelling of a text from a given genre (e.g. exposition, explanation and description) and in joint construction. These two stages are repeated several times using a variety of texts and activities which model the target genre.

In the joint analysis (or deconstruction) of a text, the teacher engages the students in discussing the main communicative purpose and main ideas of a text and how the writer organizes these ideas systematically through different stages in order to achieve the main communicative purpose. The focus is on guiding students to notice the global genre structure of the text and to see how the academic content (i.e. *field*) unfolds through the different stages of the genre. Figure 5.5 shows an analysis of a descriptive report from Grade 4 science (see also Chap. 2).

The main communicative purpose of this text is to provide a description of flowering plants (which is a subject-specific technical term), and thus this text is an example of the genre called *descriptive report*. Even though it is a short text, the academic content (i.e. the field) unfolds through the two main stages of the genre: Introduction and Description. Within the Description stage, there is a substage (called *phase*, see Chap. 3): Giving Examples. There can be more than one Description in a descriptive report although this short descriptive report has just

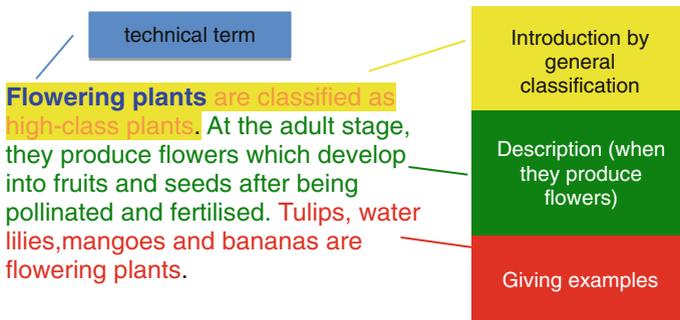


Fig. 5.5 Modelling analysis/Deconstruction of a descriptive text

**Table 5.4** Joint note-making from a text

Introduction	Flowering plants	—A kind of high-class plants
Description	Adult stage	—Produce flowers → pollination + fertilization → fruits + seeds
-giving examples		—Tulips, water lilies, mangoes and bananas

one. When the teacher jointly reads the text with the students, the teacher does the ‘deconstruction’ or analysis of the text together with the students by drawing the students’ attention to these global genre stages of the text.

Then the teacher can direct students’ attention to the main idea of each stage of the text. For instance, in the Introduction stage, the writer presents the main topic of the text (flowering plants) by classifying them or putting them into a general category of plants (high-class plants). This is a usual way of introducing the topic in descriptive reports. As the teacher guides the students to read to the second stage (Description stage), the teacher summarizes the main idea of this stage for the students: when will flowering plants produce flowers? As the teacher reads the last part of the text with the students, the teacher can summarize the main idea of this last phase: giving examples of flowering plants. In this way, the teacher models analysing the general structuring of information in the descriptive report genre through reading and analysing an example text of such a genre together with students.

During this first joint deconstruction lesson stage, the teacher can jointly make notes with the students on the main ideas of the text using a simple graphic organizer or a table. Table 5.4 shows a simple note-making table that the teacher and students can use to make notes while reading the text together:

After the first stage of joint analysis and joint note-making, the teacher can engage students in the joint construction of a new descriptive report based on the notes made in the previous stage. The teacher can ask a student to be the ‘scribe’ at the blackboard, while he/she works with the class to come up with new wordings for each stage of the new descriptive report and produce a new text together. Below is a possible lesson conversation involving the teacher and students in the joint production of a new text:

#### **Lesson Conversation Example 5.1: Teacher and Students Co-constructing a Text**

**T:** Okay, let’s try to write a new descriptive report using the notes we’ve just made. Who wants to be the scribe? Winnie, can you be our scribe? {Winnie comes out to the blackboard}

**T:** First of all, in the first paragraph, what should we have? Just now we have analysed a descriptive report together, do you remember, what do we have in the first stage of a descriptive report? {T pointing to the word INTRODUCTION in the table of notes made on the board.}

**S1: Introduction!**

**T:** Yes, Introduction. We shall introduce the topic. What is the topic? {T pointing to the relevant words in the notes on the board}

**S2: Flowering plants.**

**T:** Yes, flowering plants. We can introduce flowering plants by classifying them. Which general class do flowering plants belong to? Flowering plants belong to the category of .... of what? {T pointing to the relevant words in the notes on the board}

**S3: High-class...**

**T:** Yes, high class, high class plants. Flowering plants belong to the category of high-class plants. Let's write this down. Winnie, please help us write this down on the board: Flowering plants belong to the category of high-class plants.

{As Winnie is trying to write this down, she stops before the word, 'category'}

**T:** Okay, what's the spelling of category? Who can help? How to spell category? Look at the text we've just read and it's there.

**Ss:** c-a-t-e-g-o-r-y

**T:** Very good! Yes, c-a-t-e-g-o-r-y category.

{Winnie continues to write out the sentence on the board}

**T:** Very good! Thank you, Winnie. Okay, after introducing the topic by classifying it, what's the next stage in a descriptive report?

{no response}

**T:** Look back at the notes we've just made. {T pointing to the relevant words in the notes on the board}

**Ss: Description**

**T:** Yes, very good! Description. When do flowering plants produce flowers?

**S5: Adult, adult...**

**T:** Yes, excellent! Adult stage... How can we say this? During the adult stage, during, we can use during, like, during recess time, during holidays, now, it's during the adult stage... who can spell during for me?

**S6: d-u-r-i-n-g**

**T:** Thank you! During, let's spell it together for Winnie: d-u-r-i-n-g

{Winnie writes on the board: during}

**T:** We're starting a new sentence, so we should use capital letter 'D'.

{Winnie corrects it on the board}

**T:** Very good! During the adult stage, what happens? {T pointing to the relevant words in the notes on the board}

**S7: Produce flowers**

**T:** Yes, during the adult stage what produce flowers? {T pointing to the relevant words in the notes on the board}

**Ss:** Flowering plants

**T:** Yes, can you give me the whole sentence: During the adult stage...

**S8:** Flowering plants produce flowers...

**T:** Yes! During the adult stage, flowering plants produce flowers. {T gesturing Winnie to write this on the board; Winnie stops at the word, produce; T asks the class to spell the word together; Winnie continues to finish writing the sentence on the board}

**T:** Thank you Winnie! Now what happens next? What happens to the flowers? Can they turn into fruits and seeds?

{No response}

**T:** Okay, look at the notes we've just made. {T pointing to the relevant words in the notes on the board}

**S9:** pollination

**S10:** fertilisation

**T:** Very good! After pollination and fertilisation, flowers turn into fruits and seeds.

**T:** What can be the next sentence in the Description then?

**S11:** turn into...

**T:** Yes, after pollination and fertilisation, flowers turn into fruits and seeds.

{T gestures Winnie to write the sentence on the board. Winnie hesitates. T asks the class to spell out the word pollination together, then the word fertilisation together; Winnie writes the words on the board}

**T:** Thank you so much Winnie! Wonderful job! Now, we have come to the last part of our descriptive report. What should we have now? {T pointing to the relevant words in the notes on the board}

**S12:** Examples

**T:** Excellent, we can give examples of the flowering plants, right? Now, who can remember the examples, look at the notes we've made. {T pointing to the relevant words in the notes on the board}

**Ss:** tulips, water lilies, mangoes

**T:** Very good! How should we start the sentence to give examples?

**S13:** For example

**T:** Yes, for example, tulips, water lilies, mangoes, bananas are flowering plants.

**S14:** sunflower!

**S15:** hibiscus!

T: Oh, yes, thank you! Winnie, have you got all of these examples? {Winnie writes the last sentence: For example, tulips....; she stops at some words and the T repeats the practice of asking the class to spell out the words for her; finally she completes the sentence on the board}

T: Excellent job, Winnie! Well-done class! Let's write down this new descriptive report in your note-book.

{T gives some time to the class to copy the text from the board onto their notebooks}

The new text co-constructed by the teacher and students looks like the following:

Flowering Plants belong to the category of high-class plants. During the adult stage, flowering plants produce flowers. After pollination and fertilisation, flowers turn into fruits and seeds. For example, tulips, water lilies, mangoes, bananas, sunflowers are flowering plants.

In the above lesson conversation, the students are engaged by the teacher in co-constructing a new text based on the notes that they have made during the first stage of text analysis. In this second stage of joint reconstruction, the teacher provides ample language scaffolding to students as they jointly reconstruct a new text based on the notes made, with the teacher constantly pointing at the notes made previously on the board to provide clues to the students to answer his questions as they jointly reconstruct the text based on the notes. The new text looks very similar to the original text in terms of content but new wordings are used. Students feel a sense of accomplishment during the joint reconstruction process, even if they may be heavily guided and scaffolded by the teacher. This joint reconstruction process can be repeated several times with a few more text examples before the students are asked to independently write their own texts as assignments. In this way, the students are prepared for the writing task (e.g. to write a descriptive report) through the three stages of the TLC.

The TLC thus can help overcome the pedagogical disconnect discussed in Chap. 4. Through the three stages of the TLC, students are guided by the teacher to *unpack* an academic text and to make summary notes (joint deconstruction stage) and then they are scaffolded by the teacher to *repackage (or repack)* the notes into a new text (in the same genre) with new wordings both elicited from the students and provided by the teacher (joint reconstruction stage) before they are asked to construct their own text on their own (independent construction stage).

However, if the students' English proficiency is even more basic (as is often the case in EFL/EAL contexts), there is the need to provide even more language support to the students before they can participate in the joint reconstruction and independent construction stages. We shall need to design bridging pedagogies that

cater for these students. We shall look at how this can be done by further analysing the different components of a ‘task’.

### 5.3 Conceptualizing the Task in CLIL

So far ‘activities’ and ‘tasks’ have been used in this chapter interchangeably as if they are the same; however, it is worthwhile at this point to differentiate between the two. Tasks are, in general, more goal-directed and have a specific structure. Rose and Martin (2012) analyse the structure of a frequent classroom oral task given by the teacher to students and characterize it as having a 3-part structure: Focus-Task-Evaluate (Fig. 5.6).

To illustrate this task structure, let us look at the 3 different classroom exchanges in Fig. 5.7.

In all the 3 teacher–student exchanges in Fig. 5.7, the task is for students to propose answers to the teacher’s questions. Realistically, only the brightest students would attempt to answer the teacher’s questions, with the majority of the students not being prepared or scaffolded by the teacher to propose answers to the question. They often either offer incorrect answers that do not get affirmed by the teacher or remain silent, and this kind of experience is often frustrating to the students, as Graham Nuthall points out in his 2005 article, ‘The cultural myths and realities of classroom teaching and learning’:



**Fig. 5.6** Structure of an oral task (From Rose 2013, Slide 15; reproduced by permission of Dr. David Rose)

Teacher Students Teacher	Focus Propose Evaluate	<i>Ok, what do all living things have in common?</i> <i>Same structure</i> <i>That's right.</i>
Teacher Students Teacher	Focus Propose Evaluate	<i>Ok, what do all living things have in common?</i> <i>They're animals</i> <i>Well, all kingdoms of life are made of cells.</i>
Teacher Students Teacher	Focus Propose Evaluate	<i>Ok, what do all living things have in common?</i> <i>They're alive</i> <i>That's true, but there's something more important.</i>

**Fig. 5.7** The three-part structure of an oral task: classroom examples (From Rose 2013, Slide 16; reproduced by permission of Dr. David Rose)

The teacher is largely cut off from information about what individual students are learning... They are sustained, however, by the commonly held belief that if students are engaged most of the time in appropriate activities, some kind of learning will be taking place... Teachers depend on the responses of a small number of students as indicators ...of what most of the class knows and understands (Nuthall 2005, pp. 919–920; cited in Rose 2013, Slide 20).

Rose thus proposes that we should add a ‘Prepare’ stage and an ‘Elaborate’ stage to the task structure as shown in Fig. 5.8.

The teacher–student exchanges corresponding to the different stages of the task structure will likewise be expanded, as illustrated in Fig. 5.9 (the teacher is engaging students in a detailed reading of a biology text).

In the Prepare stage, the teacher provides positional cues and read out the relevant sentence from the text. (*The first sentence describes where the cytoplasm is ‘Cytoplasm is the part of the cell inside the cell membrane but outside the nucleus.’*) In this way, students are assisted in finding in the text the answer to the teacher’s next question. As students are helped and prepared in this way, more students are likely to be able to get the correct response and more students can have the positive experience of getting affirmed in the teacher–student exchanges. In the Elaborate stage, the teacher can provide more useful information to the students. (*The cytoplasm is the gray part inside the membrane but outside the nucleus.*)

Rose and Martin (2012) propose that in the Prepare stage there can be less expansion (e.g. focusing on literal or inferential meanings of the text) while in the Elaborate stage there can be more expansion (e.g. focusing on inferential or interpretive meanings), as illustrated in the teacher–student exchanges in Fig. 5.10. In this exchange, the teacher is engaging the students in a detailed reading of an excerpt from the story *Fantastic Mr. Fox* by Roald Dahl.

In the above teacher–student exchanges, we see that students are being prepared by the teacher to answer the subsequent question through the provision of positional cues in the text or an advance notice of what the next stretch of text is about. (e.g. *‘Then it tells us how he could see’.*) The questions asked by the teacher are also often literal or factual ones (e.g. requiring students to identify certain words or phrases from the text). The more complex information is provided by the teacher in the Elaborate stage. While this task structure seems to work well to enable more students to answer the teacher’s questions and to get affirmed, this kind of practice, however, might fall short of Gibbons (2009)’s suggestion that teachers should offer high-challenge tasks with high support. The support here is strong but the task



**Fig. 5.8** The expanded structure of an oral task (From Rose 2013, Slide 19; reproduced by permission of Dr. David Rose)

Teacher	Focus	<i>Can you see what the next phase is about?</i>
Students	Identify	<i>Cytoplasm</i>
Teacher	Affirm	<i>Right</i>
	Direct	<i>Let's all say cytoplasm again</i>
All		<i>Cytoplasm</i>
	Direct	<i>Let's highlight cytoplasm</i>
	Elaborate	<i>The cytoplasm is like the body of the cell.</i>
Teacher	Prepare sentence	<i>The first sentence describes where the cytoplasm is. 'Cytoplasm is the part of the cell inside the cell membrane but outside the nucleus.'</i>
Student	Focus	<i>[student name] What's it inside of?</i>
Teacher	Identify	<i>the cell membrane</i>
	Affirm	<i>Exactly.</i>
	Direct	<i>Let's do inside the cell membrane.</i>
Student	Focus	<i>[student name] What's it outside of?</i>
Teacher	Identify	<i>the nucleus</i>
	Affirm	<i>Right.</i>
	Direct	<i>Do outside the nucleus.</i>
Student	Focus	<i>Have a look at the diagram of a Paramecium at the top right of the page. Can you see the dark nucleus and the membrane around the cell?</i>
	Attend	<i>[look at diagram]</i>
	Elaborate	<i>The cytoplasm is the grey part inside the membrane but outside the nucleus.</i>

**Fig. 5.9** The expanded structure of an oral task: classroom examples (From Rose 2013, Slide 21; reproduced by permission of Dr. David Rose)

might not be challenging enough. However, when students' L2 proficiency is really very basic, Rose's detailed reading approach does seem to offer an important bridging strategy to gradually expand students' repertoire of L2 resources in a safe, affirming, participatory and non-threatening environment. Through this detailed reading approach, even students with very small amounts of L2 resources can experience the success of being able to answer the teacher's questions; they can also be affirmed and guided to notice how accomplished writers mobilize the language resources to accomplish different rhetorical functions and communicative purposes in a text.

In Rose and Martin's (2012) Reading to Learn (R2L) Curriculum Cycles (Fig. 5.11), Rothery (1994)'s TLC has been expanded to include cycles of joint rewriting (of sentences, short paragraphs) and independent rewriting. This approach is especially useful in EFL/EAL contexts, where students' English resources can be very basic, as opposed to ESL contexts, where ESL students might not have a lot of

Teacher	Prepare	<i>The sentence starts with two words that mean at the same time.</i>
Student Teacher	Focus	<i>[student name]. Can you see those two words?</i>
	Identify	<b>Just then</b>
	Affirm	<i>Exactly.</i>
	Direct	<i>Let's highlight <b>Just then</b>.</i>
	Elaborate	<i>Just then means just when Mr Fox took his last careful look around.</i>
Teacher	Prepare	<i>Then it tells us how he could see</i>
Student Teacher	Focus	<i>[student name]. Can you see <b>what his eyes were like?</b></i>
	Identify	<b>Sharp night-eyes.</b>
	Affirm	<i>Excellent.</i>
	Direct	<i>Highlight <b>Sharp night-eyes</b>.</i>
	Elaborate	<i>Foxes have special eyes that can see at night.</i>

Fig. 5.10 Expansion in the Elaborate stage: classroom example (From Rose 2013, Slide 39; reproduced by permission of Dr. David Rose)

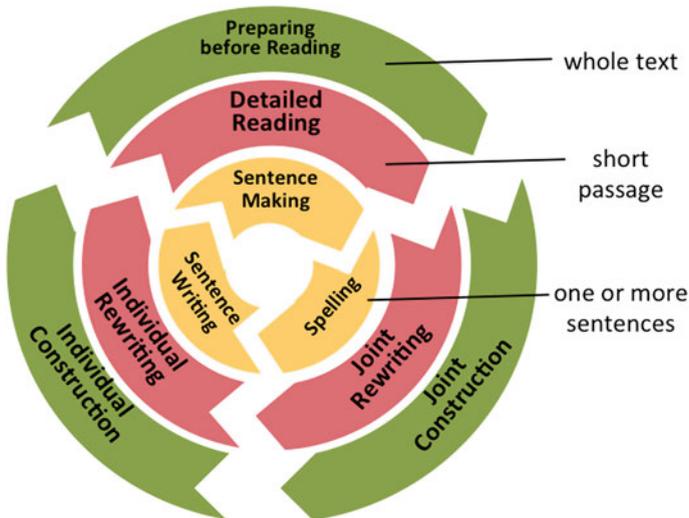
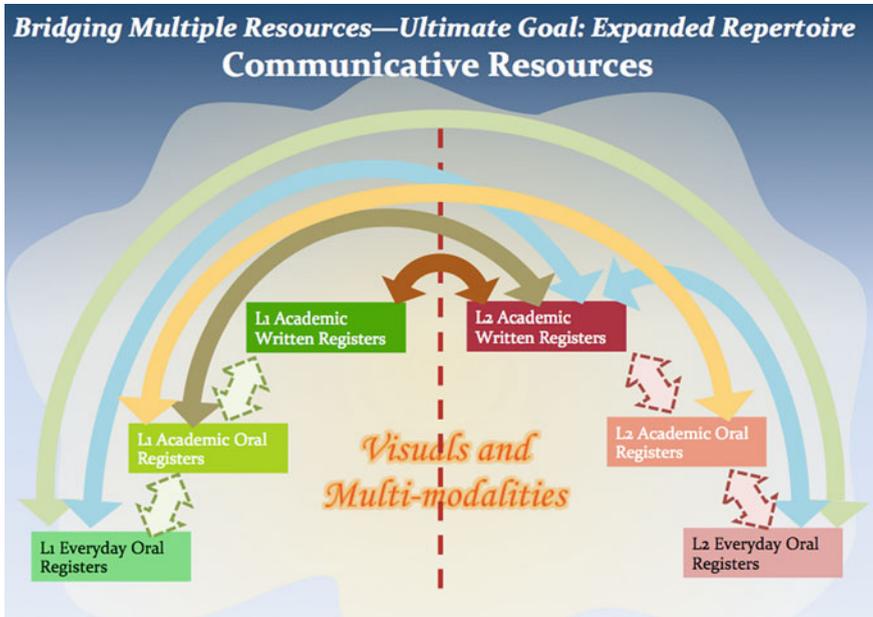


Fig. 5.11 The Reading to Learn (R2L) Curriculum Cycles (From Rose 2013, Slide 9; reproduced by permission of Dr. David Rose)

English academic language resources but might still have well-developed repertoires of everyday spoken English resources, which can serve as a bridge (see the rainbow diagram in Fig. 5.12). In EFL/EAL contexts considerably more bridging resources are needed. This will be discussed in the next section.



**Fig. 5.12** Lin’s ‘Rainbow Diagram’ (Adapted from Lin 2012, p. 93, Fig. 5.2 ‘Bridging multiple resources—ultimate goal: Expanded repertoire’; reproduced by permission of Multilingual Matters)

#### 5.4 Designing Bridging Materials in CLIL: L1, Local Languages and Multimodalities as Resources

Jim Cummins’ L1–L2 interdependence theory and notions of BICS (Basic Interpersonal Communication Skills) and CALP (Cognitive Academic Language Proficiency) in bilingual education (Cummins 1991) (see Chap. 2) have informed us on the important role that L1 or local languages and literacies can play in LAC and CLIL. In particular, it has informed Gibbons’s (1993, 2002, 2008, 2009) pedagogy of scaffolding and bridging ESL students’ academic literacy development through *rich tasks* and *high support*—*i.e. learning in the challenge zone*. Gibbons’ observation that many ESL literacy curriculums have been characterized by low-level mechanical drills and intellectually unchallenging tasks is also very true of the situation in many Hong Kong schools (Lin 1999, 2000). For instance, a preliminary analysis of the I.S. English textbooks commonly used in schools in Hong Kong shows that the textbook language is truncated and made up of almost point-form text and provides little modelling of coherent text types found in the science discipline (e.g. descriptive reports and explanatory texts). Students are provided with mainly simplified English language in these textbooks (*i.e. serving the unpacking*

function, but there is little exposure to well-written coherent academic texts; i.e. no support for repacking).

Thus, instead of dumbing down the curriculum, we need to develop bridging materials, which can draw on Gibbons (2009)'s pedagogy of designed scaffolding and bridging. Gibbons has proposed very useful principles regarding how teachers can design scaffolding and bridging in content-based ESL programmes and these principles are summarized below:

1. Programmes build on students' prior knowledge and their current language skills (both their L1/local languages and L2), while at the same time embracing new content and language goals
2. Clear and explicit programme goals are shared with the students
3. Tasks are sequenced so that each task serves as the 'building blocks' for the subsequent task
4. A variety of organizational structures is used (pair work, group work, individual work, teacher-directed whole-class work)
5. The curriculum is *amplified*, not simplified: Teachers use 'message abundance' (i.e. key ideas are presented in many different ways, including rhetoric strategies and genres, visuals and images, as well as academic social practices such as classroom/laboratory inquiry practices) (Gibbons 2009, pp. 152–158)

Thus, in designing *high-challenge, high-support* materials, we need to draw on all the resources available to the students. Figure 5.12 (see Lin, 2012, 2013a, 2013b) is a graphical representation of the different kinds of resources that can be drawn upon to scaffold students' learning of academic content and academic written registers. These resources include the following:

- L2 academic oral registers,
- L2 everyday registers,
- L1 (or local) academic written registers,
- L1 (or local) academic oral registers,
- L1 (or local) everyday registers, and
- Multimodalities (e.g. audiovisuals, images, diagrams, concept maps, graphic organizers, demonstrations, role-play, actions and gestures).

#### ***5.4.1 An Example of Using L1 or Local Language as a Bridging Resource: The Bilingual Notes Approach***

There are different ways of designing lesson materials with built-in language support. In some LAC/CLIL contexts where the students share a common L1 or local language and have some foundation in L1/local language academic literacy, carefully designed written presentation of bilingual academic content can help to scaffold students' L2 academic learning. For instance, in the bilingual notes approach developed by a team of science teachers in a secondary school in Hong

<p>第五課: 奇妙的溶劑—水</p> <p>i. 沸騰法/煮沸法 將水加熱至 100 度攝氏從而將當中的微生物殺死。</p> <p>ii. 沉澱法</p> <ul style="list-style-type: none"> <li>● 讓較大的固體雜質沉積在污水底部, 形成一層沉澱物,</li> <li>● 從而去除固體雜質。</li> </ul> <p>iii. 過濾法</p> <ul style="list-style-type: none"> <li>● 讓污水通過過濾器/濾紙, 從而去除當中雜質,</li> <li>● 濾得的液體稱為濾液;</li> <li>● 不能通過過濾器/濾紙的雜質稱為殘餘物。</li> </ul>	<p>Chapter 5: The Wonderful Solvent--Water</p> <p>i. <u>b</u></p> <p>Heating water up to 100 degrees Celsius, so as to kill the micro organisms in the water.</p> <p>ii. <u>s</u></p> <ul style="list-style-type: none"> <li>● Large solid impurities settle to the bottom of dirty water, forming a layer of <b>sediment</b>,</li> <li>● so as to remove solid impurities.</li> </ul> <p>iii. <u>f</u></p> <ul style="list-style-type: none"> <li>● Let dirty water pass through filters/filter paper, so as to remove impurities in the water</li> <li>● The resulting liquid is called <b>filtrate</b>;</li> <li>● impurities that cannot pass through filters/filter paper are called <b>residue</b>.</li> </ul>
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Fig. 5.13 The bilingual notes approach (cited in Lin 2013b, p. 529; reproduced by permission of Mr. CHEUNG Kwok-wa and Mr. CHOO-KAN Kwok-wing)

Kong, the academic content is presented bilingually (in Chinese and English) side-by-side on the same page to facilitate easy cross-referencing by the students (Fig. 5.13).

The teachers have developed a set of systematic principles in their design of this bilingual bridging approach. These principles have been summarized by the teachers as follows:

1. The students' existing needs and academic abilities are first understood and considered in the design of the materials.
2. The aims of the bridging approach are explained to students at the beginning of the programme.
3. In proceeding with this bridging approach, the students' familiar languages (spoken Cantonese and written Chinese) are used to present the content at the beginning of the programme, and then later in the programme some English is gradually introduced: first at the level of vocabulary, then at the sentence level, followed by short paragraphs and short texts.
4. The introduction of English texts is fully contextualised and students are led to use English to achieve a specific task (e.g. bilingual quizzes).
5. Teachers in the language panels collaborate with teachers in the content subject panels in the design of the programme.
6. Teachers need to have confidence in the programme in order to persist in carrying it out systematically and gradually. (Source: Mr. Cheung and Mr. Choo; cited in Lin 2013b, pp. 530–531)

According to the teachers, as many of their students understand that English is needed for their future academic studies, the students are willing to put in the extra

effort to gradually learn the academic English vocabulary and sentence patterns for the various topics. To provide further incentives for learning academic English, some assignments are designed with about 20 English multiple-choice questions (Fig. 5.14 shows some of these questions) and one to two bilingual short questions. In certain assignments, the multiple-choice questions are also bilingual and graded according to the level of difficulty. The contents and style of the bilingual assignments, quizzes and tests follow those of the bilingual notes (see Fig. 5.13). Students are thus encouraged to complete the short questions in English by referring to the bilingual notes (Lin 2013b).

As the students gradually gain more L2 academic resources, the bilingual notes approach can be gradually phased out but some language support can still be built into the lesson materials through the provision of L1 or local language equivalents of difficult L2 terms as well as the use of multimodalities (e.g. visuals, symbols, images, graphic organizers and mind maps), which will be discussed below.

### 5.4.2 *The Multimodalities–Entextualization Cycle (MEC)*

Another set of useful bridging strategies involves shifting between different kinds of textual and multimodal mediation of academic content/experience (Lin 2012, 2013a, b, 2015a, b). The core processes behind the use of these strategies are diagrammatically represented in Fig. 5.15. It consists of three core processes, which are explained as follows:

#### *Core Process 1:*

Create a rich experiential context to arouse students' interest, and immerse the students in the content topic field using multimodalities (e.g. visuals, images, YouTube videos, diagrams, demonstrations, actions, inquiry/discovery activities and experiments)

#### *Core Process 2:*

Engage the students in reading and note-making tasks that require some systematic 'sorting out' or re-/presentation of the experience gained from the above using different kinds/combinations of everyday L1/local language/L2 spoken/written texts and multimodalities (e.g. (bilingual) notes, graphic organizers, mind maps, visuals, diagrams, pictures, oral description, storyboards and comics)

#### *Core Process 3:*

Engage students in *entextualizing* the experience using L1/local language/L2 (spoken/written) academic genres (e.g. experimental design) with language scaffolds provided (e.g. key vocab, sentence-generating tables, writing and speaking templates)

3Chem\_0708\_Assignment\_1/ p.1

## F.3 Chemistry 2007-2008

Assignment 1: Unit 1 - Safety in Laboratory

Unit 2 - Matter



Class: \_\_\_\_\_ ( ) Date: \_\_\_\_\_

Name: \_\_\_\_\_ Marks/Grade: \_\_\_\_\_ / 40

## Part 1: Multiple Choice Questions

Choose only ONE answer for each of the following questions.

Put a 'v' into the corresponding box.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A.			v		v		v				v				v					
B.									v	v				v				v	v	
C.	v			v		v		v									v			
D.		v										v	v			v				v

- You are NOT allowed to enter a school laboratory unless
  - a monitor is present.
  - a school prefect is present.
  - a teacher is present.
  - a technician is present.

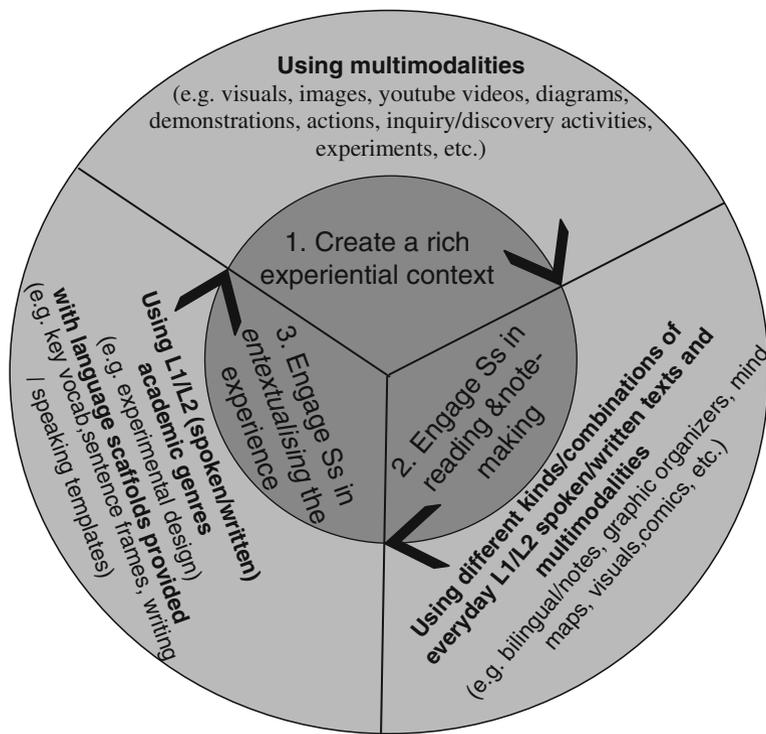
C
- If you pour some chemicals onto your hand accidentally, you should
  - wash the hand with plenty of acid.
  - wash the hand with plenty of alkali.
  - wash the hand with plenty of salt solution.
  - wash the hand with plenty of water.

D
- Which hazard warning label would you put on a bottle of concentrated hydrochloric acid?
  - corrosive
  - irritant
  - oxidizing
  - toxic

A
- Which hazard warning label would you put on a bottle of hydrogen peroxide (雙氧水)?
  - corrosive
  - irritant
  - oxidizing
  - toxic

C

Fig. 5.14 Excerpts from an assignment (cited in Lin 2013b, p. 533; reproduced by permission of Mr. Cheung and Mr. Choo)



**Fig. 5.15** Multimodalities–Entextualization Cycle (MEC) (Key: *Ss* students)

These three core processes form a curriculum cycle called the Multimodalities–Entextualization Cycle (MEC) (Lin 2015a, b) (Fig. 5.15). An example of Core Process 1 can be seen in Activity 1 in the Unit of Work (‘What is a Scientific Investigation’) in Appendix A. Examples of Core Process 2 can be seen in Activities 2–4. Examples of Core Process 3 can be seen in Activities 4–5.

The MEC can be reiterated until the target LAC/CLIL goals have been achieved; the amount of L1/local languages used can vary depending on the needs of your students (e.g. in the Unit of Work in Appendix A, the amount of L1/local language use is well-controlled but it can be expanded depending on the L2 proficiency of students in a particular context). Furthermore, the TLC and R2L cycles discussed above can also be inserted into the MEC at any point deemed appropriate (e.g. between processes 1 and 2, or 2 and 3, or 3 and 1). While the MEC (Lin 2015a, b) is still in its conceptualization and piloting stage, more curricular studies in the future will provide us with more information on how the MEC can be further refined, elaborated and adapted by teachers to suit the needs of students in diverse multilingual and multicultural contexts.

*Application Scenario 5.2 Designing Bridging Materials: Building in language support*

Suppose you are designing a CLIL unit of work on photosynthesis for a Grade 8 class. Work with a collaborating teacher (if you are a content teacher, work with a language teacher, and vice versa) to incorporate an MEC in your unit. You can also embed a TLC or R2L cycle in the MEC. The material below is taken from the website of *Science and Plants for Schools (SAPS)*, where you can find teaching resources on many science topics including the topic of photosynthesis for high school students.

**The story of photosynthesis**

Take a look at how plants make their food.

We know that the food plants made from photosynthesis are called CARBOHYDRATES.

If we look at the word,  
CARBOHYDRATE,  
we can tell quite a lot about it.

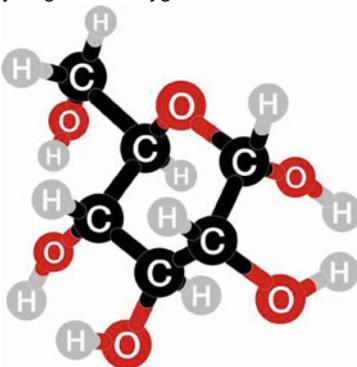
Carbohydrates contain the atoms CARBON, HYDROGEN and OXYGEN

So, which part of the word means that it contains carbon?

And which part of the word means that it contains hydrogen?

Now, can you suggest what the letters 'ATE' mean when placed on the end of a chemical name?

The diagram below is a chemical picture of one carbohydrate. Count how many carbon, hydrogen and oxygen atoms this chemical has...



(Source <http://www.saps.org.uk/secondary/teaching-resources/134-photosynthesis-a-survival-guide-teaching-resources>; copyright © Dr. Debbie Eldridge; reproduced here by permission of Dr. Debbie Eldridge)

## 5.5 Scaffolding via Classroom Talk

Apart from designing materials that incorporate language support and multi-modalities to assist students' learning, an important bridging strategy is to provide scaffolding via classroom talk in conjunction with specially designed bridging materials. Scaffolding via classroom talk can be provided at a minimum level through the provision of L1/local language annotations of key L2 vocabulary, as illustrated in the following lesson excerpt from a Grade 9 mathematics lesson in a Hong Kong school. The teacher, Ms. Sitt, is explaining a mathematical operation that requires the understanding of the key lexical phrase: replace... by...

18:40 ... replace Tangent  $\Theta$  by 2.

Look at the board.

replace Tangent  $\Theta$  by 2. (*T repeats*)

replace by 代替咗佢, okay?

18:56 For this second way, what have they done here, Alice?

And then? What happens on the third line?... What have they done here?

How about the fourth line? What have they done?...

... to replace the...

20:22 Okay, Alice, one more question.

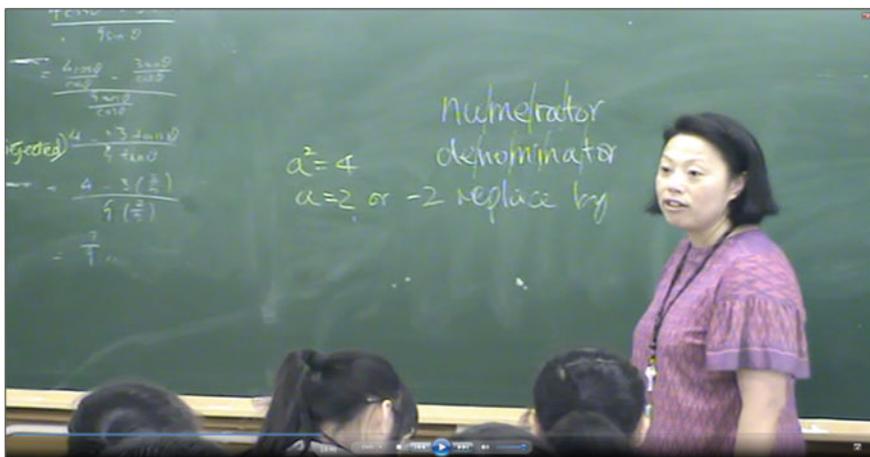
Why do they have to replace it?

(Tavares 2015, pp. 328–331)

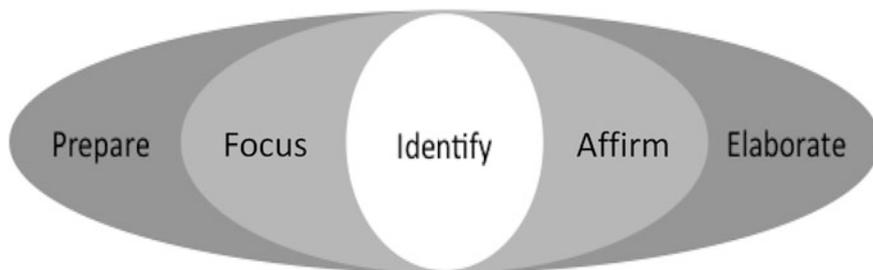
The teacher annotates the key lexical phrase ('to replace by...') using the students' more familiar language (the Cantonese phrase 代替咗佢 means 'to replace by...'). In addition, she uses the *syllabification* strategy to help students 'chop up' multisyllabic words such as 'numerator', 'denominator' into different syllables in order to aid their learning of these key words in mathematics (see Plate 5.1). By skillfully interweaving a focus on the language aspects into her math lesson, the teacher builds in language support via classroom talk (Tavares 2015).

Scaffolding via classroom talk can go beyond the minimal level of annotating key vocabulary. If students have a very basic L2 proficiency and yet owing to education policy issues, there is a strong desire for parents to put their children into L2 medium programmes, and then classroom scaffolding using L1 or local languages needs to be systematically planned into the structure of a learning task. Figure 5.16 shows the orbital structure of a learning task.

In the 'Prepare' phase of the learning task, L1 can be used to help students prepare for the task. Similarly, in the 'Elaborate' phase of the activity, L1/local language can also be used to help students apply what is learnt in new contexts. I shall use the example in Sect. 5.2 above to illustrate this point.



**Plate 5.1** Syllabification strategy used by Ms. Sitt (reproduced here by permission of Ms. Winnie Sitt)



**Fig. 5.16** Design principle: Orbital structure of a learning task (From Rose 2013, Slide 38; reproduced by permission of Dr. David Rose)

### 5.5.1 *The Prepare Phase*

In preparing students to read the descriptive report, the teacher needs to arouse students' interest in learning about flowering plants. This is called the Prepare phase in Rose's structure of a learning task. In this phase, a lot of strategies can be used: showing students pictures or videos of different kinds of flowering plants, or getting students to actually observe and examine a real flowering plant in the school garden (if this is available and feasible), or telling the life story of a flowering plant using the first person perspective (using personification: e.g. I'm a papaya tree... I grew up in Bangkok...). In this phase, L1/local language can be used to stimulate students' interest and background knowledge about the topic. Students can brainstorm

all their knowledge about flowering plants using L1/local languages (e.g. they might know the names of some flowering plants in their L1/local languages) and the teacher can help them translate some of these words into L2.

### 5.5.2 *The Elaborate Phase*

In the *Elaborate* phase, i.e. the final phase of the learning task, L1/local languages can also be used to apply what has been learnt in new contexts. For instance, students can be encouraged to produce an info-poster on flowering plants. In this phase, the teacher can use L1/local languages to explain how to make an info-poster using an e-tool (e.g. comic life, toondoo and glogster) or how to organize and lay out different kinds of information about flowering plants in the poster. Furthermore, L1/local languages can be used to help students gain awareness of some new language patterns useful in creating new sentences for the poster; for instance, how to design a catchy heading for the poster.

In the *Focus, Task* (which can be *Propose* or *Identify* or other kind of work), and *Affirm* phases of the learning task, while L2 is maintained as the main language, L1/local language can be used systematically and judiciously to provide annotations of key vocabulary (as shown in Ms. Sitt's example above) and multimodalities can also be used to assist the students to accomplish the task (e.g. teacher pointing to the relevant parts of a graphic organizer, a table, or a diagram to provide the position cues of the relevant words/content).

#### *Application Scenario 5.3 Plan a unit of work that incorporates language support using L1/local language(s) and multimodalities*

Re-design a unit of work from your current academic subject curriculum and explore ways of incorporating language support and multimodalities into the materials. Then plan for the systematic use of L1/local language(s) in the different phases of the unit of the work, e.g. in the Preparation and Elaboration phases of the learning activities. As you are doing this, bear in mind the language proficiency levels of your class of students and try to visualize the different kinds of scaffolding they would need in order to participate successfully in the learning activities.

#### *Summary Points*

- Curriculum mapping and cross-curricular collaboration are good strategies to overcome the intercurricular disconnects discussed in Chap. 4.
- Bridging pedagogies can be designed through redesigning the traditional curriculum genres; some such examples include: TLC, Read-to-Learn (R2L) Cycle; and Multimodalities–Entextualization Cycle (MEC); these

redesigned curriculum genres aim at building systematic language support into the content lesson.

- Re-conceptualizing the structure of the task: building in a ‘Prepare’ phase before inviting students to respond, this will enable more students to experience a sense of success with the task.
- The Bilingual Notes Approach as an example of how L1/local language and resources can be systematically and judiciously used to provide support to students as they try to learn content in an L2; L1/local languages/resources can also be built into the ‘Prepare’ phase and the ‘Elaborate’ phase of the task structure.

### ***End-of-Chapter Discussion Questions***

1. Can you briefly describe how to do note-making in the ‘Deconstruction’ (text analysis) stage in order for the teacher to effectively guide students through the joint reconstruction stage? For example, how are the words in Table 5.4 finally selected and laid out by the teacher for students to write down on their notebooks in preparation for the next stage of co-construction? Can there be other ways of doing this?
2. The teacher–student exchange sequence with the ‘Prepare’ and ‘Elaborate’ stages can help to ensure that every student gets useful information and receives affirmation apart from the best students. If this is the case, how can we make the top students feel challenged under this framework?
3. It has been said that students in many East Asian contexts are often too shy to speak up. If this is true, how can we engage more students in brainstorming in the joint construction stage?
4. The author discusses how L1/local language(s) and multimodal resources can be used in the teacher–student exchanges in the ‘Deconstruction’ stage of the TLC. How can these resources be effectively used in the ‘joint construction’ stage as well in order to encourage more student contribution?
5. From your understanding of the key issues discussed in this chapter, can you explain in your own words the relationships among the terms ‘activity’, ‘task’, ‘classroom talk’ and ‘teacher–student exchange’?

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