

Late Immersion in Hong Kong: A Pedagogical Framework for Integrating Content-Language Teaching and Learning

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Despite a long history of publicly-funded English immersion education, late immersion in Hong Kong is not achieving the dual goals of content and second language learning at levels that an immersion curriculum can expect. The growing importance of English in the Asia Pacific region places an urgent demand on Hong Kong, and indeed its neighbouring cities and countries, to improve language-in-education policies and practices. To support the improvement of an aspect of practice within the late immersion curriculum, this paper offers a pedagogical framework for integrating content and second language teaching and learning to guide late immersion pedagogy. The proposed framework draws on three main sources of knowledge: first, the concepts of knowledge structures, text structures and language objectives; second, some of the teaching and learning problems observed in late immersion classrooms in Hong Kong; third, extensive experience of working with teachers who have attended an in-service immersion teacher education programme.

Key words: late immersion, content-language integration, knowledge structures, text structures, language objectives

INTRODUCTION

The growing importance of English in the Asia Pacific region (Chan & Tan, 2006; Hu, 2005; Jin & Cortazzi, 2002) places an urgent demand on Hong Kong and its neighbouring cities and countries to provide an effective second language curriculum and to improve language-in-education policies and practices. Immersion education and other content-based second language teaching approaches are becoming more common educational responses to this in countries such as Mainland China and Malaysia (e.g. Chan & Tan, 2006; Hu, 2002, 2007; Tan, 2005). In Hong Kong, late immersion is a major long-established second language curriculum. Late immersion, which takes place in secondary schools (Grades 7-13), aims to develop students' second language **and** content knowledge by teaching content subjects in the second language (Baker, 2006; Swain & Johnson, 1997). Research evidence suggests, however, that "many Hong Kong immersion teachers do not have the pedagogical skills ... to integrate the teaching of language and content in the classroom in ways that can bring about the learning of both" (Hoare & Kong, 2008, p. 254). This paper offers a pedagogical framework for integrating content and second language teaching and learning to guide late immersion pedagogy to address this limitation.

The proposed framework draws on three main sources of knowledge: first, the concepts of knowledge structures, text structures and language objectives, which are pedagogical theories and approaches that support content-language integration; second, some of the teaching and learning problems observed in late immersion classrooms in Hong Kong; third, 15 years of experience of working with teachers who have attended an in-service immersion teacher education programme. Though the empirical support for the framework comes from the late immersion curriculum in Hong Kong, the framework may be applicable to other Asian content-based second language teaching contexts.

The paper first sets the context by describing the late immersion curriculum in Hong Kong and some reasons for its inadequate achievements. It then

presents the pedagogical framework by first reviewing the literature on relevant studies, then illustrating some of the teaching and learning problems in late immersion classrooms in Hong Kong through an extract of teacher discourse and a student's writing, and finally describing the framework and explaining how it provides a resource for teachers' planning of content and second language teaching and learning.

LATE IMMERSION IN HONG KONG

Immersion education started in Hong Kong in the colonial days when Britain ruled the city and English was the medium of instruction in many schools. However, by the 1970s the Hong Kong education system had changed “from *elite early immersion*, primary education through English for a minority of children, to *almost universal late immersion*, in which over 90% of the secondary schools claimed to use English as the language of instruction” (Hoare & Kong, 2008, p. 244, original emphasis). In 1998, a year after the return of sovereignty to China, the government cut the number of late immersion schools to only 112 (about 25% of the secondary schools). Even with this decrease, a large number of teachers and students are still involved (approximately 50 x 112 teachers and 1000 x 112 students).

Despite a long history of a fully publicly-funded immersion curriculum, late immersion in Hong Kong has been and still is facing a lot of stress (Hoare & Kong, 2008; Johnson, 1997). Two major longitudinal quantitative studies of late immersion in Hong Kong have indicated negative learning outcomes (Marsh, Hau & Kong, 2000; Yip, Tsang & Cheung, 2003). Both studies involve territory-wide student assessment results from more than 50 schools over a number of years. Marsh et al. (2000) used data from before 1998 while Yip et al. (2003) used data from after 1998. Marsh et al. (2000) focused on science, geography, history and mathematics and concluded that “immersing high school students into L2 instruction has very negative effects” (p. 339) on their content learning, though they showed slight positive

effect on English learning. Yip et al. (2003) focused on science and found that “English-medium students, despite their higher initial ability¹, were found to perform much more poorly than their Chinese-medium peers” (p. 295). Kong’s (2004) study on the use of writing in four Grade 10 late immersion biology and history classrooms found that students’ writing did not demonstrate the levels of content and second language learning expected of late immersion classrooms.

Studies of the teaching and learning processes in these classrooms suggest some reasons for these negative learning outcomes. There is evidence of inappropriate immersion teaching strategies (e.g. Education Commission, 1990; Johnson, 1983, 1985, 1997). The use of mixed code, which ranges from “the use of here and there a few English lexical items in otherwise Cantonese utterances/sentences to the intertwining of extended English and Cantonese utterances/sentences” (Lin, 2006, p. 288), was common in the 1980s and 1990s. Studies of late immersion classrooms after 1998 reveal much more consistent use of English but this still does not necessarily mean that teachers have the language awareness and the related pedagogical skills to be able to use language to support students’ learning through a second language (Hoare, 2003, 2004; Hoare & Kong, 2006; Kong, 2004). Tsui, Marton, Mok and Ng (2004) studied the use of questions in Hong Kong classrooms and found that questions in late immersion classrooms tended to “reduce the space of learning by confining students to only a restricted number of possibilities and even by encouraging them to engage in guesswork” (p. 130). This is mainly due to the students’ lack of linguistic resources with which to answer open questions and the teachers’ use of a “funnelling” strategy to narrow down the questioning to a filling-in-the-blank or choosing-between-two answer. In analysing the classroom discourse of some late immersion lessons, Tsui (2004) concluded that language is a key resource for sharing the space of learning between teachers and students and when there is “a lack of linguistic resources (particularly on the part of the

¹ In Hong Kong, late immersion schools rank the academically top 25% (Hoare & Kong, 2008).

students, although sometimes it can also be on the part of the teacher)” (p. 182), the shared space becomes much less. Both studies indicate the students’ inadequate second language repertoire to learn subject content through the language and the teachers’ lack of appropriate pedagogy to support this learning. Hoare (2003, 2004) contrasts the teaching strategies of three ‘more language aware’ and three ‘less language aware’ science immersion teachers. The more language aware teachers were more effective in making science content accessible to their students through English and in helping students use the English of science. For example, they were able to identify and ‘unpack’ complex science meanings packed in technical vocabulary (e.g. *neutralisation*), which often represents fundamental content meaning, through a variety of strategies (e.g. giving definition, giving examples, contrasting with related words, writing the word on the board, asking students to say it out loud, recycling the word). They were also able to help students construct meanings of new concepts by relating them to their existing ‘folk’ concepts (e.g. *salt* as sodium chloride and a product of neutralisation contrasted with the white solid we use in the kitchen).

Hoare and Kong (2001) argue for the need to focus on specialised teaching strategies, not just proficiency in the immersion language, in immersion teacher education. These strategies should focus on how to integrate the teaching of content and second language to bring about the learning of both (Hoare & Kong, 2008). This pedagogical focus seems to be appropriate for late immersion classrooms in Hong Kong for four reasons: first, a key immersion curriculum objective is that students learn the second language as they learn subject content through the language; second, both teachers and students may need support for language use to bring about content-language learning, as suggested in the review of studies of late immersion classrooms above (also refer to the extract of teacher discourse and student’s writing discussed below); third, the content and, therefore, language learning demands in secondary schools are high and curriculum time is limited; fourth, immersion teachers in Hong Kong, as in most other late immersion contexts, are mostly subject-trained but not language-trained (Fruhauf, Coyle, & Christ,

1996; Marsh, Marsland, & Nikula, 1997). Pre-service training does not generally deal with immersion. In Hong Kong, there is only one 8-week full-time in-service programme on late immersion education. It is in light of this need for immersion teacher education and the apparent lack of appropriate pedagogy that this paper offers a pedagogical framework for integrating content and second language teaching and learning.

A PEDAGOGICAL FRAMEWORK FOR INTEGRATING CONTENT-LANGUAGE TEACHING AND LEARNING

Literature Review

The proposed framework draws on the concepts of knowledge structures (Mohan, 1986), text structures (Derewianka, 1996; Martin, 1989) and language objectives (Snow, Met, & Genesee, 1989). This section reviews some related studies and discusses their relevance to the proposed framework. To illustrate the pedagogical relevance of the concepts, references will be made to the following text on the generation of hydro-electricity at a water power station², which is an example of how content, organised as a knowledge structure, can be represented in language, organised as a text structure:

A water power station produces electricity by making use of the power of water. When water runs through the turbine, the force of water turns the turbine. The turning turbine moves the dynamo. This generates electricity.

² This text is a product of collaboration between myself and a number of science teachers studying on the in-service programme mentioned above. The science teachers were asked to write an answer to an examination question used by a Grade 7 science teacher (refer to the question in the section on student writing below). They did it in groups of 3-4. I worked out this text based on the answers written by a few groups and showed it to a number of science teachers. It was agreed that the text explains appropriately, though in simple terms, the process of generating electricity at a water power station and that it is an adequate answer for Grade 7 students.

Mohan (1986) proposes a theoretical framework of knowledge structures which attempts to describe how knowledge can be organised. Knowledge structures represent relationships between ‘bits’ of knowledge which Ogborn, Kress, Martins & McGillicuddy (1996, p. 14) usefully refer to as “entities”. Entities are, therefore, related to one another to form knowledge relationships and knowledge itself can therefore be thought of as a complex network of relationships between entities. Identifiable patterns found in these relationships are what Mohan refers to as knowledge structures. Mohan’s framework consists of three categories of general theoretical knowledge relationships (classification, principles and evaluation) and three corresponding categories of specific practical knowledge relationships (description, sequence and choice). Knowledge structures are helpful because they are recognisable ways of thinking about and organising knowledge that subject disciplines in schools aim to help students learn (see Figure 1, adapted from Tang (1994), for some examples of thinking patterns related to each knowledge structure). The knowledge of the generation of hydroelectricity, for example, involves the entities of *water*, *turbine*, *dynamo* and *electricity* and the cause-effect relationships between them. The knowledge structures involved are relating causes and effects within the practical knowledge of sequence and its corresponding theoretical knowledge of principles.

TABLE 1
Knowledge Structures and Related Thinking Skills (adapted from Tang, 1994)

Classification (Description)	Principles (Sequence)	Evaluation (Choice)
Classifying	Explaining	Evaluating
Defining	Relating causes and effects	Giving opinions
	Drawing conclusions	Justifying actions
Describing	Describing procedures	Making decisions
Naming	Describing time and	Identifying problems
Comparing and	chronology	Proposing solutions
contrasting	Describing events in order	

Mohan argues that knowledge structures are “bridges between language and content” (1993, p. 15) and advocates the need for a common agenda to

link “languages, cultures, subject areas and media” as “a necessity for education in an internationalising world” (ibid.). He suggests identifying knowledge structures in curriculum materials and learning processes as a starting point, based on which links with language can be explored. Research has since been conducted on the pedagogical applications of knowledge structures in various content-based language learning contexts (e.g. Early, 2001; Mohan, 1993; Mohan & Beckett, 2001; Mohan & Huang, 2002; Mohan, Leung, & Davison, 2001; Tang, 1992, 1994).

Using knowledge structures, Tang (1992, 1994) proposes a classroom model focusing on teacher input and student tasks for integrating language-content teaching and learning. Teacher input requires the explicit teaching of knowledge structures and their graphic representations and language which can express the meanings of the relationships inherent in the knowledge structures, for example, the language of comparison, the language of cause-effect, etc. Student tasks require students to construct graphics from texts and texts from graphics based on related knowledge structures. Tang (1992) reported on a teacher in Canada who adopted the model in her Grade 7 social studies class with ESOL multiethnic students and who successfully helped students to write coherently, using the knowledge structure of cause-effect. Tang (1994) observed eleven Grade 7 classrooms in one Chinese(L1)-medium and two English(L2)-medium schools in Hong Kong and confirmed the presence of knowledge structures in textbook materials and classroom instruction, though they were neither systematically nor regularly used. She also found the use of a variety of graphics related to knowledge structures which students were able to understand. She noted the use of mixed code teaching in the English-medium schools, where content was taught mainly in Cantonese with the use of English vocabulary. She suggested that knowledge structures and their related graphics may be an effective bridge between Chinese-medium and English-medium instruction.

Mohan and Beckett (2001) analysed extracts of classroom interaction between ESL students and their teacher on the topic of ‘The Human Brain’ in a university content-based course. They examined the teacher’s use of recast

to scaffold students' learning of the cause-effect knowledge structure in their oral presentations on the topic at discourse and lexico-grammatical levels from a systemic functional linguistic perspective. They found that when the teacher used recast strategies such as eliciting elaborations from students, repairing students' difficulties in language use to make accurate meaning, a "zone of negotiation" (p. 151) is formed between the teacher and the students. This helped students elaborate meaning using English that was needed to express the content meanings more clearly and accurately. They suggested that the teacher's use of recast to scaffold students' use of the language of the content (in this case the language of cause-effect) is important for supporting students' advanced language development. They concluded that the causal knowledge structure acts as a link between the content and the language, giving the language use a clear focus and purpose.

Mohan and Huang (2002) studied the integration of language and content/culture in Grades 5 and 6 English students' written Chinese discourse and suggested that assessment of the integration is possible through knowledge structures which "acted as a hinge ... between language and content/culture aspects" (p. 429). They identified the knowledge structures of the content/culture in a unit of learning and the language related to each knowledge structure. The language identified focused on discourse structures rather than isolated language features. They also analysed students' writing for the use of knowledge structures and related language and found that the students were able to use appropriate language, albeit at the elementary level, that shows "clear differences in formal features between sequence and classification discourses" (ibid.). Sequence and classification are two key knowledge structures in Mohan's framework (See Table 1 above). They concluded that knowledge structures can be used to support the planning for integration of language-content teaching and assessment of students' language and content learning.

Thus, though "[W]ork on the analysis of K[n]owledge S[tructure]s in discourse is a recent development" (Mohan & Huang, 2002, p. 417), there is research evidence, at elementary, middle and university levels, that knowledge structures can function as "bridges between language learning and content

learning” (Mohan & Beckett, 2001, p. 133). This paper proposes to move one further stage beyond the use of knowledge structures, as links between content and language, to text structures, as organised and structured linguistic representations of content, to provide teachers with a pedagogical framework to integrate content and language teaching (see Figure 1 for a comparison between Mohan’s content-language links and the framework proposed in this paper).

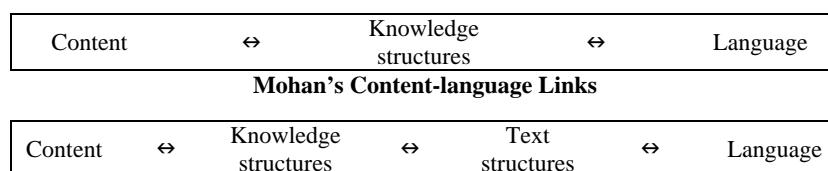


FIGURE 1
Content-language Links in the Proposed Framework

The term ‘text structures’ is used in the proposed framework to mean genres and to emphasise “the *schematic structure* of ... text” in genres (Macken-Horarik, 2002, p. 20, original emphasis). The “schematic structure” is pedagogically useful because a structure can be learnt. Genres are “socially recognised ways of using language for particular purposes” (Hyland, 2003, p. 18) to “respond to recurring situations” (Hyland, 2004, p. 4). The use of language for the same purpose in frequently occurring and predictable situations results in a genre. A daily life example of a genre is buying stamps at a post office. In the academic field, subject disciplines demand the use of subject-specific genres. Each genre has a schematic structure and “a predictable sequence of stages” (Macken-Horarik, 2002, p. 20). Each part in the structure or each stage of a genre is “a distinctive communicative act designed to achieve one main communicative function” (Hyland, 2004, p. 47). Together, the schematic structure or the sequenced stages of a genre achieve(s) the communicative purpose(s) required by a particular situation of language use. For example, the hydroelectricity text quoted at the beginning of this section belongs to the genre/text structure of explanation (Derewianka,

1996; Martin, 1989). The purpose of the text is to explain how electricity is generated at a water power station. This communicative purpose is achieved in a written text through a “predictable sequence of [two] stages”: first, the identification of the process to be explained (the first sentence); second, the explanation sequence (the other sentences) (Derewianka, 1996).

There are many ways of categorising academic genres/text structures and different names are sometimes used to refer to the same genre/text structure (see Table 2 for some examples of academic genres). Derewianka (1996) and Martin (1989) provide detailed analysis of the structure/stages of each genre using sample school and student texts. The work with the immersion teachers attending the in-service programme mentioned above shows that the following genres/text structures are most common in the school subjects in late immersion classrooms in Hong Kong:

- Procedure
- Explanation
- Description
- Information report
- Discussion
- Evaluation

TABLE 2
Examples of Academic Genres / Text Structures

Derewianka (1996)	Martin (1989)	Macken-Horarik (2002)	Hyland (2004)
Procedures	Recounts	Recount	Recount
Recounts	Procedure	Information report	Procedure
Stories	Report	Explanation	Narrative
Explanations	Explanations	Exposition	Description
Persuasion	Exposition	Discussion	Report
Discussion		Procedure	Explanation
Information reports		Narrative	Exposition
		News story	

The emphasis on how language is used in response to the purposes and context, and the recurrent and therefore predictable structure/stages of use

makes genres/text structures helpful tools for teaching and learning in the subject disciplines through a second language. The subject content offers immediate and genuine purposes and context, and the recurrent structure/stages allow describable and therefore teachable forms of language use. This is not to say that genres should be taught as fixed language forms. In fact, the need to make meanings in the subject disciplines prevents this. Some scholars contend that being able to function in appropriate academic genres is an important part of learning the subject disciplines and the language of the disciplines (Christie & Martin, 1997; Martin, 1993; Martin & Veel, 1998). Others argue that “students need explicit induction into the genres of power if they are to participate in mainstream textual and social processes within and beyond the school” (Macken-Horarik, 2002, p. 17). This explicit induction is particularly useful to L2 learners who have very little knowledge of the social and cultural context of the language, as is the case of the late immersion students in Hong Kong (Hyland, 2004).

It is proposed that text structures, as ways of organising language use to achieve communicative purposes, can be linguistic manifestations of knowledge structures, as ways of organising content. A pedagogical framework that relates text structures to knowledge structures can therefore, in principle, provide an organised approach to integrating content and language teaching and learning. Table 3 shows some possible correspondences between knowledge structures and text structures.

TABLE 3
Examples of Knowledge Structures and Corresponding text Structures

Knowledge Structures	Text Structures
Classification	Information report
Description	Description
Principles	Explanation
Sequence	Recount, Procedure, Narrative
Evaluation	Discussion, Evaluation
Choice / decision making	Persuasion, Recommendation

In order that content and language learning can be systematically planned

and achieved, the pedagogical framework also draws on Snow et al.'s (1989) idea of language objectives. Mohan and Huang (2002), Snow et al. (1989), and Swain (1996) acknowledge the need to plan for integrating content and language in immersion and content-based language classrooms as they recognise that language learning will not automatically take place alongside content learning. Snow et al. (1989) propose a conceptual framework for integrating language and content instruction. They propose that 'content-obligatory' language objectives and 'content-compatible' language objectives are identified to specify language learning outcomes. These language objectives are based on content objectives because content-obligatory language is the language essential to represent the content (i.e. the language that students must learn in order to learn the content) while content-compatible language is language relevant and related but not essential to the content. Content-obligatory language can be identified at two linguistic levels: discourse and vocabulary (i.e. content-obligatory vocabulary). Using the example of generation of hydroelectricity, the content-obligatory language at the discourse level is the language to describe a process of cause-effect relationships manifested as the text structure of an explanation (the hydroelectricity text quoted at the beginning of this section being an example). The content-obligatory vocabulary is the subject-specific words: *water, turbine, dynamo, electricity, generate*, etc. (i.e. the words that represent the entities involved). Names of places where there are hydroelectric power stations, for example, belong to content-compatible language.

Content-obligatory and content-compatible language objectives ensure that language learning outcomes are planned within the context of content learning outcomes, thereby supporting a planned approach to integrating content and language teaching and learning. This approach allows content to dictate and drive the use of language to mean, which is recognised as effective for content and language learning because the content is the meaning, and human communication is always driven by meaning (Halliday, 1993; Mohan & Beckett, 2001; Mohan & Huang, 2002).

Teaching and Learning Problems: Teacher Discourse and Student Writing

Before describing the pedagogical framework, this section presents and discusses an extract of teacher discourse and a student's writing to illustrate the nature of the teaching and learning problems the proposed framework aims to address. The following extract of teacher discourse comes from a Hong Kong Grade 7 science immersion lesson in Semester 2 on energy sources. The teacher is a science graduate with methodological training in the subject, but not in immersion. The extract shows the teacher's full explanation of how tidal energy generates electricity, one of the seven energy sources introduced in the topic. This requires an explanation of a process involving cause-effect relationships. The extract, however, shows reliance on simple language use, namely deictics (single-underlined in the extract) and additive connectives (double-underlined in the extract), in place of the language of cause-effect³.

T: And the fourth thing. Tidal energy, what is tidal energy? You have to learn this word first. Tide. What is tide? XXX (naming a student).

S: 潮水 (student answers "tide" in Chinese)

T: Yes, 潮水 (repeats the Chinese phrase). How can we make use of tide to produce electricity? OK, please look at this diagram all together (shows a diagram on the projector). Also you can find that diagram in your book but it is very small. Let's look at it here. Ah, here is the dam (points to the dam on the projector) and **where should we build this dam?** For example, this is a river and the opening of the river into the sea. And just at the opening of this river we build a dam here. And this dam is this one, OK? (draws a diagram of river, sea and dam on the board while talking) When the tide is rising, the tide is rising, the sea water will rush into the river, right? And the water will rise up

³ The teacher explained the generation of hydroelectricity in the previous lesson. He revised it before this extract, also with reliance on the use of deictics (underlined): "Yes, hydroelectric power. Remember, we need the water, we need a large amount of water coming down and then the water here can turn the turbine. When it go down it can turn the turbine and it can produce electricity here but it needs a large river."

here, OK? When the water is rising, all the water will ... all the water should run into this way. (points to relevant parts on the projector and the board while talking) OK, so it will turn ... it let the turbine turn. OK? And the water will rush into the river, it will pass through the dam, and in the dam there is a turbine. It will turn. When the turbine turns remember, it can generate electricity. In the other way round when the water fall down, when the tide is falling down here, the water will rush out, water rushing out of it and then the turbine will turn again. In the same time, er, we can also produce electricity here. OK? Understand? When water go rushing in or rushing out it also let this turbine turn. (points to relevant parts on the projector) That's how we produce electricity. OK? Understand?

S: Yes. (chorus)

The teacher begins with an attempt to explain why a dam needs to be built at the mouth of the river with the question “*where should we build this dam?*” (in bold in the extract). The question is, however, answered with the use of three deictics to refer to relevant parts of the diagram the teacher is using: “*this is a river and the opening of the river into the sea. And just at the opening of this river we build a dam here.*” While the use of a diagram to support explanation is an effective pedagogy, this use of deictics provides a description of facts (i.e. where the river, the river mouth and the dam are) but not an explanation of a cause-effect relationship (i.e. we build a dam at the river mouth so that water will rush through it). The next part of the explanation on how the rising water turns the turbine uses two deictics in the same way: “*And the water will rise up here, OK? When the water is rising, all the water will ... all the water should run into this way.*” Without reference to the diagram, it is impossible to understand the cause-effect relationships involved as the spoken description does not explain these. Deictics are also used to explain how low tide generates electricity.

In explaining how high tide generates electricity, the teacher uses three *ands* (the first three double-underlined). The first *And* could represent a cause-effect relationship (i.e. the sea water rushes into the river, so the water in the river rises). Arguably, in spoken discourse, the context (e.g. the fact

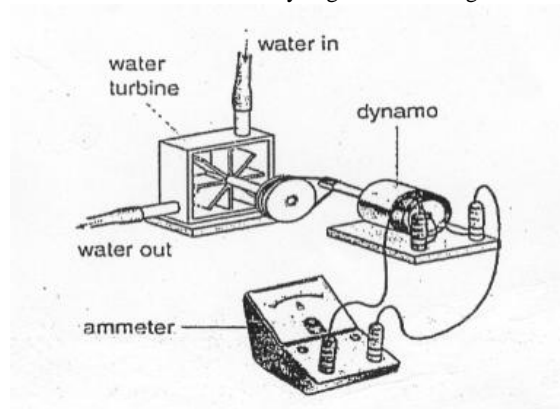
that the teacher is explaining a concept, the diagram) helps to make the cause-effect relationship clearer despite the use of *And*. The second *And* repeats a previous description but repetition is common in spoken language and in teacher explanation. The additional information provided by the third *and* (i.e. there is a turbine in the dam), however, breaks up the next stage in the process. So in place of a sentence showing the cause-effect relationship (e.g. the water passing through the dam will turn the turbine), the added clause (i.e. *and in the dam there is a turbine*) breaks up the relationship (i.e. *it will pass through the dam + added clause + It will turn*). The cause-effect relationship is thus lost. The use of *and then* to connect the rushing out water and the turning turbine in the explanation of how low tide generates electricity does not adequately represent this relationship either. The use of the two *alsos* that follow emphasises too much the additive connection and therefore further obscures the cause-effect relationships. There seems to be reliance on students understanding the cause-effect relationships more through the context than the teacher discourse.

This is an example of a teacher trying to help students understand the content through a discourse that does not optimally express the knowledge relationships the students need to understand. In addition, the teacher's discourse does not demonstrate to students how to use English to make knowledge relationships clear and therefore does not help students learn to use such English. One of the eight core features of immersion education is that "exposure to the L2 is largely confined to the classroom" (Swain & Johnson, 1997, p. 7). This exposure is therefore a major source of language input for immersion students, with teacher discourse being a major source of spoken input. When the spoken input is of the kind of restricted discourse shown in the extract above, it may hamper students' second language development and in turn their academic learning (Hoare, 2003). Immersion teachers need to be able to use appropriate discourse in the second language to explain subject content and to support students' learning of the language (Hoare & Kong, 2001). The framework proposed later in this paper provides a guide to planning for this discourse in the context of content-language teaching and learning.

Now, we turn to a student's writing. The following is a Grade 7 student answer to a science examination question asking how electricity is generated in a hydroelectric power station.⁴

Question:

The following set-up shows how electricity is generated in a hydro-electric power station. Describe how electricity is generated using this model.



Answer:

First put lake water in pipe. Next go to turbine, then the water go out to the sea, when the dynamo move, there will have electricity.

This is an inadequate answer for the question. The question asks for a description of the process of how electricity is generated at a water power station. This requires an explanation of a sequence of events involving cause-effect relationships. The content-obligatory vocabulary (representing the entities) is used at the correct stages in the sequence of events: *water* → *turbine* → *dynamo* → *electricity*, and the causal relationship between the moving of the dynamo and the generation of electricity is recognised and

⁴ Writing is not common classroom practice in content lessons in Hong Kong especially in Grades 7-9. Students mostly write for examination purposes (Kong, 2004).

signalled with the use of *when*. The answer as a whole, however, is more a description of a sequence of actions than a coherent chain of cause-effect relationships. This is reflected in the use of the sequence connectives *First*, *Next* and *then* followed by base verb forms, resulting in language use which suits more the text structure of an instruction (i.e. a procedure) than that of an explanation. The student does not seem to be able to use the text structure of an explanation adequately to explain the knowledge relationships involved (compare this student writing with the hydroelectricity text quoted at the beginning of the literature review section).

This kind of student writing performance is consistent with the findings in Kong (2004). Given a classroom situation where there is restricted teacher discourse as in the extract discussed above, coupled with the fact that students are learning the language of instruction as they are learning the content, it is no surprise that they can only produce writing of the quality shown in this student writing. The inadequate performance may be a content problem (e.g. students do not understand the content), a processing problem (e.g. students do not understand the question), a language problem (e.g. students do not have the language to write accurately) or, more likely, a combination of these. Whatever the cause, there is a language-related learning problem. The proficiency gap (i.e. the gap between the language level needed to represent the subject content and the students' language proficiency level) for late immersion students is wide (Johnson & Swain, 1994), and the cognitive and language learning load in secondary schools, especially through a second language, is heavy (Berthold, 1995; Wolff, 2002). Explicit teaching of both the content **and** the language to represent the content is essential to provide students with support for learning both. The pedagogical framework proposed below provides a guide to planning for this learning.

The Framework and its Applications

Drawing together the concepts of knowledge structures, text structures, and language objectives that relate to content objectives, a pedagogical framework can be devised for immersion teachers' use to support students'

content and language learning (see Table 4). The framework focuses on *organised content*, through identifying knowledge structures in the content objectives, and *structured language*, through identifying text structures from the knowledge structures, which guide the selection of language objectives. The use of knowledge structures entails a focus on knowledge relationships rather than individual entities. This supports higher order learning, which suits the needs of late immersion classrooms. It also draws more directly on subject teachers' knowledge of the content, which they may see first as knowledge relationships rather than as language. Knowledge structures, therefore, provide subject teachers with a "bridge", as Mohan (1993) recognises, to cross between content and language. Figure 4 shows an example of part of a plan on the topic of generating hydroelectricity using the pedagogical framework.

TABLE 4
A Pedagogical Framework for Integrating Content and Language
(exemplified with the process of generating hydroelectricity)

Topic	Content objective	Knowledge structure	Text structure	Language objective
How hydroelectricity is generated at a water power station	Students should be able to explain the cause-effect relationships in the process of generating hydroelectricity at a water power station	Cause-effect in a sequence	Explanation (of a process)	Students should be able to write to explain the cause-effect relationships in the process of generating hydroelectricity at a water power station using the text structure of an explanation as in the example below: A water power station produces electricity by making use of the power of water. When water runs through the turbine, the force of water turns the turbine. The turning turbine moves the dynamo. This generates electricity. ⁵

⁵ This is the same text as quoted at the beginning of the literature review section.

Using the pedagogical framework, a unit of learning can be planned following this procedure:

1. Identify content objectives of a topic with reference to the subject curriculum;
2. Identify knowledge structures of the content required in the content objectives;
3. Identify corresponding text structures of the knowledge structures;
4. Identify language objectives from the content objectives and the text structures by specifying the actual discourse of language use to make content meaning (see the explanation text in the language objective column in Figure 5 for an example).

This is, of course, a simplified linear representation of the procedures involved in actual planning, which has to be a recursive process. A change in one component in the framework will also effect corresponding changes in the others. The content objectives, for example, can be identified by taking into consideration what knowledge structures the teacher considers appropriate at students' current stage of learning, i.e. the level of complexity at which the topic is to be studied and which the students can handle. If the knowledge structure of evaluation is considered more or also appropriate for this topic, the content objective can be changed to "Students should be able to evaluate the advantages and disadvantages of generating hydroelectricity at a water power station" or this content objective can be added. This change will effect corresponding changes to the text structures and the language objectives.

Such a plan can provide a guide to the language the teacher chooses to use in her explanation. Though the difference between spoken and written language means that the teacher can probably not restrict her spoken explanation to the discourse specified in the language objectives, the language specified provides a target and a focus for the teacher. A language aware teacher can use **and** explicitly draw students' attention to the key language (in the plan above, mainly the verbs, the noun phrases and the

when-clause, underlined in the language objective column). For example, the language can be written on the board for students, in the same way as vocabulary is written on the board for emphasis. A planned and targeted approach to language use of this kind provides students with focused language input that supports content-language learning. The production of a plan of this kind can also help to raise the teacher's awareness of the discourse needed. The teacher may then be less likely to resort to a restricted discourse of the kind shown in the previous section.

Finally, the plan can also provide a guide for teachers in supporting students' language use to learn. If students need to learn the subject discourse as part of their subject discipline learning, teaching and learning activities have to be designed to support this. It has been shown that working with text structures through a teaching-learning cycle (building context → modelling and deconstruction of texts → joint construction of texts → independent construction of texts → linking related texts → building context, and so on) can be effective (Hyland, 2004; Macken-Horarik, 2002). Other learning activities, such as transferring information in text form, which can be related to a text structure, to graphic form and vice versa (Tang, 1992, 1994), can be designed to help students use the appropriate language. The framework proposed guides the explicit and focused teaching of language within the context of content teaching to support students' learning of both and to help students produce appropriate and well-organised language to mean.

CONCLUSION

The framework described in this paper draws together existing content-language integrated pedagogical approaches: knowledge structures, text structures and language objectives. It aims to guide late immersion teachers' planning and design of content-language teaching and learning. The framework has been developed over a number of years as part of the curriculum development of the in-service programme for late immersion teachers in

Hong Kong mentioned in this paper and, in its current form, is part of the course materials on the programme. Teachers have been able to use the framework to plan a unit of learning in their subject. It is beyond the scope of this paper to provide detailed exemplars of plans or teaching materials illustrating how the framework might be used in an immersion curriculum. It is also, of course, necessary to research further with teachers how the framework can best be applied in their classrooms.

The crux of the framework is teachers' awareness of the content-language relationships and how language makes content meaning. Only with this understanding can they plan the language use to suit content learning needs and support content-language learning.

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