A Pedagogical Framework for Content-language Integrated Teaching at Middle School Level

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This paper reports a case study of how a language-trained teacher followed three principles to integrate content-language teaching to help a Grade 7 class in China to learn both content and language within a content-based language teaching curriculum. The three principles are 1) plan from the content; 2) integrate content and language teaching; and 3) teach the language of the content explicitly (Kong & Hoare, 2010). The teaching can be considered a success as evidenced in the students' oral and written test results. The study analyzed a unit of learning using data from the lesson transcript, the interview with the teacher, the written and oral test results of the students, and the questionnaire responses from some students. The findings suggest refinements to the three principles leading to a two-tier pedagogical framework at the levels of planning and teaching. Possible pedagogical practices are suggested within each level that can support the use of the framework in implementing content-language integrated teaching at the middle school level.

Introduction

Met (1998) describes the variety of approaches to integrating content and language in content-based language teaching (CBLT) as a continuum ranging

from the content-driven end (e.g., immersion programs) to the language-driven end (e.g., theme-based language classes in some ESL contexts). Whatever the balance between content and language along the continuum, "[W]hat sets CBLT apart from other kinds of instruction is the expectation that students can learn – and teachers can teach – both academic subject matter content and a new language at the same time" (Lightbown, 2014, p. 6, my emphasis). There are different curriculum models for supporting students' content and language learning, ranging from "offering language instruction in a class that is separate from content classes to a fully integrated organization in which one teacher is expected to ensure that students learn the content … and the new language" (Lightbown, 2014, p. 29). Even when language instruction is offered in a separate class, the language taught has to be what is needed for content learning. Content-language integrated teaching and learning, therefore, becomes a major pedagogical focus in CBLT. In discussing challenges for further research, Stoller (2004) maintains that investigation into "the interface of language and content" (p. 276) is the most important pedagogical issue for all CBLT models.

This paper reports a case study of how a language-trained teacher adopted three principles, proposed in Kong and Hoare (2010), to integrate content-language teaching to help a Grade 7 class in China to learn both content and language in a unit of learning within a CBLT curriculum. The paper will first review studies on CBLT pedagogies to establish the need for pedagogical support for content-language integrated teaching. The aim and the context of the case study, and the methodology and data collected will then be described, followed by the report of the findings of the study. These findings suggest refinements to the three principles from which a two-tier pedagogical framework can be formulated at the levels of planning and teaching. Some possible pedagogical practices are then suggested that can guide the implementation of the framework in content-language integrated teaching at the middle school level. The findings in this paper may be relevant to other CBLT contexts such as CLIL (content-language integrated learning) in Europe and late immersion programmes in North America when similar

demands for content-language learning can be established (Cenoz, Genesee, & Gorter, 2014).

The Need for Pedagogical Frameworks
for Content-language Integrated Teaching

Pessoa, Hendry, Donato, Tucker, and Lee (2007) recognize that there is limited research into how CBLT "is actually appropriated, understood, and carried out" (p. 103) to support content-language integrated teaching. In their study comparing two Grade 6 CBLT classes taught by a language-trained teacher and a dually (i.e., content-language) certified teacher, they found a predominant focus on language learning tasks in contrast to academic content tasks in both classes. They further found that the greater use of academic content tasks by the dually certified teacher led to more use of content-related talk, resulting in a wider range of grammatical control by her students. Other studies have shown that language-trained teachers, especially at the upper-primary and middle school levels, tend to simplify the content or do not engage students with sufficiently demanding content, which results in correspondingly undemanding language use (Hoare, 2010; Kong, 2009). On the other hand, studies of CBLT lessons taught by content-trained teachers document the dominance of a concern for content coverage, not surprisingly, and an assumption that students will learn the language without explicit support, when the content is taught through the language (Dalton-Puffer, 2007; Kong, 2009).

Within CBLT, it is now well-established that teaching content without explicit support for the language will not lead to the desired level of language learning (Lightbown, 2014; Lyster, 2007). At the middle school level and beyond, the content is more complex and thus requires correspondingly more complex language use. This, coupled with the fact that CBLT teachers are generally either content-trained or language-trained (Kong, 2009; Schleppegrell & de Oliveira, 2006), makes content-language integrated

teaching and learning at the middle school level and beyond more challenging. Consequently, the need for these teachers to acquire the pedagogical knowledge and skills for content-language integrated teaching has been called for (Cammarata & Tedick, 2012; Hoare & Kong, 2008; Pessoa et al., 2007).

Studies of CBLT classrooms often show individual language teaching strategies that can complement other (content) teaching strategies to support learning (e.g., Swain, 2001; Zwiers, 2008). Examples of these strategies are:

- organizing collaborative tasks that require students to use the target language
- providing language scaffolds that help students expand and elaborate their answers and thus their target language use
- giving students some target language forms to support their task completion

When pedagogical frameworks are proposed, they tend to be at the curriculum and planning level rather than the classroom implementation level. These include:

- Mohan's notion of knowledge structures that provide a bridge between content and language (1986)
- Snow, Met, and Genesee's conceptual framework involving language objectives with content-obligatory language and content-compatible language (1989)
- Kong's expansion of Mohan's knowledge structures into a framework with content objectives, knowledge structures, text structures and language objectives (2008)

The framework for CBLT pedagogy Lightbown (2014) includes, in her state-of-the-art review of some findings and recommendations from research in the field, is mainly language-based: Nation's four strands of meaning-

focused input, meaning-focused output, fluency development and language-focused learning (pp. 65-69). Short, Vogt, and Echevarria's SIOP® model (2011), with 8 components and 30 features, provides a framework at both the planning and classroom implementation levels. The inclusion of content and language objectives in the framework connects the planning and the implementation. The SIOP® model is based on classroom data from the North American context. The current study is a further attempt at formulating a pedagogical framework at the levels of both planning and teaching, using data from an Asian context where class size is normally bigger. Also, the focus of the study is on the middle school level where the content-language integration is more challenging because of the more complex content.

Kong and Hoare (2010) proposed three principles to guide the planning and teaching of content-language integrated lessons at the middle school level: 1) plan from the content; 2) integrate content and language teaching; and 3) teach the language of the content explicitly. They illustrated how these principles were applied by content-trained and language-trained CBLT teachers in Asian contexts to provide input and elicit from students spoken and written output of the language of the content. The pedagogical strategies employed were modelling the language of the content, eliciting the language of the content through scaffolded interaction, and supporting students' writing of the language of the content. Because the classroom data used in their study came from different teachers and different lessons, they do not represent a coherent account of how a teacher can plan and teach a CBLT lesson/unit to support students' content-language learning. The case study reported in this paper is an attempt to provide such an account through investigating a teacher's planning and teaching, and her students' content and language learning in two CBLT lessons that form a unit of learning.

Aim and Context of the Case Study

The case study reported in this paper aimed to investigate the pedagogical strategies and practices a language-trained teacher used, following the three principles in Kong and Hoare (2010), to plan and teach two CBLT lessons. The lessons were from a unit on classification in science for a Grade 7 class in China. It aimed to elaborate the three principles into a pedagogical framework that can better support CBLT teachers in implementing content-language integrated teaching.

The CBLT lessons studied come from the CCUEI (China-Canada-United States English Immersion) program in Xi'an, China. The program started in 1997 on a small scale at the kindergarten level and extended to middle schools by 2004 (Hoare, 2007). By 2007, four middle schools participated in the program. Yu (2009) asserts that the CCUEI program is the first example of a CBLT model in China. At the middle school level, it is effectively content-based language teaching rather than immersion because in each of the four schools, only one 'subject' is taught through English by a language-trained teacher for two lessons each week. The content taught in this 'subject' has to be different from that in the formal school curriculum because the language law in China requires the latter to be taught through Chinese (Kirkpatrick & Xu, 2001).

The teacher in this case study had 11 years of English language teaching experience and four years of CBLT experience in the same school at the time of data collection. She has a first degree for English language teaching from China and was studying a Masters in English Education. She is therefore trained to teach English and not a content subject but she has attended professional development workshops on how to plan and teach CBLT lessons as part of the CCUEI program. In the workshops, she was introduced to the three principles in Kong and Hoare (2010) and the design of content and language objectives.

She taught the Grade 7 class, from which the data for this study were collected, seven English lessons and two CBLT lessons per week. The CBLT

lessons and the English lessons were treated as two separate 'subjects' with very little connection between them, as confirmed by the teacher. The English lessons focused on the teaching of grammar, as specified in the school curriculum, and the CBLT lessons focused on 'Nature and Society', as part of the CCUEI program. Each lesson was 50 minutes in length. There were 48 students (32 girls and 16 boys) in the class, which is fewer than the usual 50 to 60 in China.

The students had studied English as a subject in primary school where the focus was on grammar teaching. The only exposure they had to English was in the English and CBLT lessons. More than half of them had had CBLT lessons in primary school but about 30% had only had CBLT lessons from Grade 7. They came from lower middle socio-economic status families as the district within which the school is located in Xi'an is mainly inhabited by families of this status.

The two lessons focus on the classification of vertebrates into the five groups of fish, amphibian, reptile, bird and mammal based on the four defining features of body covering (e.g., scales or feathers), the method of breathing (e.g., gills or lungs), the method of reproduction (e.g., laying eggs or live birth), and control of body temperature (whether they are cold-blooded or warm-blooded) (see Appendix for the stages in the two lessons). The two lessons form part of the unit on classification in science and are preceded by two lessons on the concept of using a key for classification purposes. In these two preceding lessons, the students learnt about classifying things into living and non-living, living things into animals and plants, animals into vertebrates and invertebrates, and vertebrates into five groups.

Methodology and Data

A case study approach was adopted to enable an in-depth exploration into a range of data collected relating to the teacher's content-language integrated teaching in the two lessons. The data include 1) the transcript of the two

lessons, each of about 50 minutes in length; 2) a one-hour post-lesson interview with the teacher; 3) a written test consisting of two short questions for all students; 4) a short oral test for each of the 9 students selected by the teacher; and 5) a questionnaire with 11 questions for these 9 students. A case study involving multiple sources of evidence allows data triangulation and investigation into different aspects of an issue to build a fuller understanding (Yin, 2009), which is appropriate for the aim of this study. Specifically, the study aimed to answer the following research question:

Under each of the three principles in Kong and Hoare (2010), what are the pedagogical strategies and practices used by the teacher to support students' content and language learning?

The lessons and the interview with the teacher were transcribed. The transcripts were analyzed using the three principles as the analytical framework to find out the pedagogical strategies and practices the teacher used. The interview with the teacher was conducted in English. A semi-structured protocol was used where the interviewer could further explore any points with the teacher when needed (Wiersma & Jurs, 2009). The interview questions aimed to find out the teacher's knowledge of the CBLT approach and the reasons behind the pedagogical decisions she made in planning and teaching the two lessons.

The written test required students to write sentences to answer two short questions. The first question asked them to explain how birds and fish are the same or different, and the second asked them to classify bats and to explain their classification. They were reminded to use what they learnt from the two lessons to answer the questions. The written test was administered in class on the third day after the second lesson was taught. The students' answers were assessed, on a score scale of 1 (lowest) – 5 (highest), and analyzed for both content and language learning. The assessment criteria focus on the articulation of an understanding of the content through the use of the language of the content. Two researchers each scored the answers independently. For each answer where there was disagreement, which was never by more than one level, a third marker scored it using the same criteria.

The third marker always agreed with one or the other of the first markers and the score agreed on was accepted.

Three students each of high, middle and low levels of performance were selected by the teacher for the oral test. The test was administered immediately following the written test. A researcher asked each student individually which group of the five vertebrates a penguin belongs to. The student was also asked to explain its classification and how a penguin is different from other animals in the same group. The students had to classify penguins during class when they were asked to construct a classification key for the five things given to them (plane, pigeon, bat, penguin and butterfly) but they did not have to explain the classification (see Lesson 1 Stage 5 in Appendix). The question was set to avoid testing of memory of facts but to focus on the learning of the key concepts taught in the lessons i.e., the rationale for how vertebrates are classified into five groups (the same approach was taken with the questions in the written test). The students' answers were recorded and transcribed for scoring using a similar set of assessment criteria to the written test. The same scoring procedure as used with the written answers was adopted with the oral test. The oral test therefore provides a complementary source of data to the written test concerning students' content and language learning.

The nine selected students were also asked to answer 11 questions on a questionnaire while others were taking turns to have their oral test. The 11 questions were written in both English and Chinese, and the students were allowed to use either language to answer the questions. This is to avoid the language being a possible barrier to the data collected. The first 9 questions focused on their learning experience using the CBLT approach and the preparation and revision work they did for these lessons. The last two questions asked them to state the new content and the new English they learnt from the two lessons, which provides further evidence of their content and language learning. Students' responses to the last two questions are the only data used from the questionnaire in this study.

Findings

This section first describes the general pedagogical approach adopted by the teacher as found in the analysis of the lesson transcript to aid contextualized understanding. It then presents the analysis of the pedagogical strategies and practices the teacher used to plan and teach the two lessons, using the data from the lesson transcript and the interview with the teacher. The analysis of the lesson transcript also provides some evidence of students' content and language learning. Further evidence of this learning from the students' written and oral test results and their questionnaire responses is presented next.

Despite the large class size, the two CBLT lessons were generally very interactive in nature, within a mainly teacher-centered approach. In most of the lessons the teacher took a leading role in asking students questions, students responded to her questions and she followed by requiring elaborations or providing guidance for better responses (i.e., the lessons exhibit an IRF (initiation-response-feedback) classroom interaction pattern (Sinclair & Coulthard, 1975)). There were also group discussion activities (see Appendix). The interactive nature of the lessons is evidenced in an almost equal number of turns between the teacher and the students. The two lessons consist of 381 teacher turns (with a total of 675 lines) and 397 student turns (with a total of 429 lines).

Teacher Planning and Teaching

The analysis of how the teacher operationalized the three principles in Kong and Hoare (2010) suggests a two-tier pedagogical framework at the levels of planning and teaching that requires adjustments to the three principles (namely, 1) plan from the content, 2) integrate content and language teaching, and 3) teach the language of the content explicitly). The two-tier framework, as shown in Table 1 below, is used as the frame for the presentation of the findings in this section.

TABLE 1
A Two-tier Pedagogical Framework for Content-language Integrated Teaching

Principle	Planning	Teaching
Start from the content	Identify the content learning objectives	Organize the content to revolve around the content learning objectives
Integrate content and language	Identify the language of the content	Help students learn the content using the language of the content
Focus on the language	Identify the language learning objectives	Explicitly help students achieve the language learning objectives in the context of the content

Start from the content

Planning: Identify the content learning objectives

The teacher showed awareness of the need not only to 'plan from the content' (as the original first principle states) but also to make the content, not the language, as the starting point for her planning. When asked what the learning objectives of the two lessons were, she stated the content learning objective first before mentioning the language learning objective:

> …how to classify animals by their physical features. That is the content objective and for English objective, they have to learn…

When asked what she understood as CBLT, she confirmed the focus on the content first:

> It means to teach the subject through English. …at the same time we have both objectives. One is content, the other is language.

Her awareness of the need to start from the content and to make the content as the lead is confirmed by her elaboration of what she wanted the students to learn, how she helped them use the language and her belief that they could learn language in the CBLT lessons:

> The content is important. …I want them to learn more about science. …They should learn how to classify things and they should use some necessary sentence structures to, to describe each group of animal. They have to use them [the sentence structures] when they are necessary to the content.
>
> They improve their English, er when they are studying the subject content.

Teaching: Organize the content to revolve around the content learning objectives

She identified the key concepts of the content to learn as classification and the defining physical features of the five groups of vertebrates. In the teaching, she organized the lessons stage by stage focusing on these key concepts. Other than Lesson 1 Stage 2 (which uses a guessing game to help students revise key vocabulary), all major stages in the lessons focus on the concepts of classification and the defining physical features (see Appendix for the stages in the two lessons), including:

- revision of classification keys (Lesson 1 Stage 1)
- student sharing of their preview of the physical features of the five groups of vertebrates (Lesson 1 Stage 3)
- comparing the vertebrates feature by feature using a chart (Lesson 1 Stage 4)
- classifying five things with wings (Lesson 1 Stage 5)
- revision of the physical features using the comparison chart (Lesson 2 Stage 1)

- revisiting the classification of five things with wings, focusing on two different approaches (Lesson 2 Stage 2)
- classifying a list of living and non-living things (Lesson 2 Stage 3)
- elaborating specifically the features of cold-bloodedness (one of the physical features), fish (one group of vertebrates), and shark (a non-typical fish) (Lesson 2 Stages 4 - 6)

These stages were also organized in a spiral manner i.e., not just by exploring the key concepts but also reviewing points at increasing depth to foster better and deeper learning. For example, in Lesson 1 Stage 4, the students were helped to describe each of the five types of vertebrates feature by feature using a comparison chart; in Lesson 2 Stage 1, the students had to use the same chart to describe any feature of any type of vertebrate at random. There is a similar increase in depth between Lesson 1 Stage 5 and Lesson 2 Stage 2.

Integrate content and language

Planning: Identify the language of the content

In the interview, the teacher explained how she identified the language for the content. The demands of the content led to the language choice:

> For the first lesson, they should learn how to classify things by their physical features. That is the content objective and for English objective, they have to learn 'can be classified into, breathe with lungs or gills, lay eggs to reproduce or give birth to babies to reproduce'.
> Er, second lesson, they should learn some details about fish and shark. …Vocabulary is the, is a bit of the point. …there are some new words for them: bury, hibernate, fins.
> …they are necessary for the, for this lesson. For example, 'bury' is not very important. But, but for some words, 'lay eggs, reproduce, breathe', they are necessary, if they don't know these words, they can't describe

the features or characteristics of each group of animal. …These words are necessary for this class.

Teaching: Help students learn the content using the language of the content

The lesson transcript reveals how she used and helped students use the language of the content that she identified as necessary to help them learn the content and the language. In Lesson 1 Stage 3, she focused the students' attention on the initial stage of learning of the content and the language through the group sharing of their preview. This was followed by questioning and students' reading of the text used in their preview to guide them to start using the language of the content. She accepted the use of not very accurate language for the content and single words (double underlined in the extract below) e.g., 'have gills' instead of 'breathe with gills', 'have scales on their body' instead of 'their body is covered with scales'. When students used the language accurately for the content, she repeated or expanded it to reinforce the learning (single underlined in the extract below).

> T: OK. Let's share our information together. First group fish, which group on the first? XXX.
>
> ---
>
> T: What characteristics do they have?
> S19: They live in water.
> T: They live in water and then?
> S19: They, they have, they <u>have gills</u>.
> T: They have gills.
> S19: They have backbones.
> T: They have back…, of course they have backbones. Ok, anything else?
> S19: That's all.
> T: That's all. Ok. Anything else? XXX, please.

S4: Er, they <u>have scales on their body</u>.

T: They have scales on their, on the surface of their body. Yes, these scales can protect them from being, being hurt. OK, XXX, what else?

S20: They <u>breathe with gills</u>.

T: Yes, they <u>breathe with gills</u>. What else? XXX, please?

S7: They live, they live in the water and er, <u>lay eggs</u> er, in the water.

T: They <u>lay eggs</u> in the water <u>to reproduce</u>. To…

S7: <u>Reproduce</u>.

T: OK, thank you. Let's look at the, look at the characteristics of fish. Er, let's read it together. OK? They breathe, one two.

Ss: They breathe with gills. They reproduce by laying eggs.

Ss: They <u>don't have constant body temperature</u>.

T: Yes, they <u>don't have constant body temperature</u>. It means their body temperature changes with the environment, right? So these are the characteristics of fish. And that, next group. [Lesson 1 Stage 3 ll.170-201]

[Lesson transcript codes: T = teacher; S = student (the number indicates a different student); Ss = students together; XXX = student name; … = pause; --- = lines skipped; * * = words said at the same time]

She helped the students to gradually progress by demanding more accurate language use for the content in the next stage of the lesson in which she showed a comparison chart of the physical features. She provided the students with some guiding questions and refused to accept single-word answers (see the first three turns in the extract below). She modeled the language use often with students repeating it after her (single underlined in the extract). She challenged the students when she was unsure of their language use until they used it accurately (double underlined in the extract).

T: This time you can use this chart, use this chart to compare the five groups. What do they have in common? And what are the differences? OK. So, breathe, breathe. Here you can use these questions. These kinds of questions. How do fish breathe? How do amphibians breathe and reproduce? How do amphibians reproduce? What are reptiles' bodies covered with? In other words, what's on their body? And are birds warm-blooded or cold-blooded? So you can use these questions or sentences to describe each group. OK, breathe. How do fish breathe? XXX.

S30:   Gills.

T: Could you give me complete sentences? … Fish…

S30:   The fishes er, …the fishes with gills.

T: Fish <u>breathe with gills</u>. OK, XXX. It's your turn. Amphibians.

S31:   Er, amphibians <u>breathe with</u>…

T: <u>When they are young, they breathe with gills. As they grow into adult, how do they breathe?</u>

S31:   Lungs.

T: <u>Lungs? How do they breathe lungs?</u>

S31:   *They <u>breathe with lungs</u>.*

T: *They <u>breathe with lungs</u>.* Thank you. Next one. XXX.

S24:   Reptiles, er <u>breathe with lungs</u>.

T: Reptiles <u>breathe with?</u>

S24:   <u>Lungs</u>.

T: <u>With lungs</u>. OK, thank you. And XXX, please.

S26:   Birds <u>breathe with lungs</u>.

T: Birds <u>breathe with lungs</u>. Thank you. XXX.

S32:   Mammals <u>breathe with lungs</u>.

T: Mammals <u>breathe with lungs</u>. Thank you. And XXX. This time we use the second column. How do fish reproduce? [Lesson 1 Stage 4 ll.332-359]

Towards the end of this extract, S26 and S32 were able to use the language of the content accurately to tell how birds and mammals breathe, showing some evidence of learning. The teacher guided the students through the five groups of vertebrates feature by feature in a similar manner. This supported their learning of the content and the language through repeated use of the language of the content with a focus on the accuracy of both content (see the dotted underline in the extract above) and language. Because each major stage of the lessons focused on these features as the defining classification characteristics, there were multiple opportunities for students to use the language. The teacher purposely engineered this repetition for learning as she said in the interview:

> I repeat the language, again and again. …I designed some activities or exercises… to require the students to use it, then they will learn.

Her view of how the language use supports content learning is also evident in the interview:

- Interviewer   When a student said 'Birds lay eggs', you said 'to…'? So why do you insist on them finishing the answer with 'to reproduce'?
- Teacher   They will be aware of the, the use of 'lay eggs'. So they will have better understanding.

She considered the student language use of 'to reproduce' as helpful to their 'better understanding' of the content ('the use of 'lay eggs').

Focus on the language

Planning: Identify the language learning objectives

The teacher's choice of the language of the content was reported in (2) above where she stated the language learning objectives for the lessons. She

elaborated on these objectives in more specific language forms later in the interview as: 'can be classified'; 'lay eggs to reproduce' or 'reproduce by laying eggs'; 'breathe with lungs' or 'use lungs to breathe'; 'their body is covered with fur, with feather, with skin'; 'constant body temperature' or 'their body temperature is constant' or 'changeable'; 'warm-blooded' and 'cold-blooded'. She identified these because they are 'necessary' for the content and they were used throughout the two lessons by herself and the students.

Teaching: Explicitly help students learn the language in the context of the content

We have seen how the teacher helped the students learn the content and the language by requiring them to use the language again and again in the context of the content in (2) above. This is made possible because the stages of the lessons revolve around the key concepts of the content. For example, when exploring more features of fish in Lesson 2 Stage 5, she started with a revision of the features of fish in which she still insisted on the students using the language in full for the content e.g., 'breathe with gills' not just 'with gills' (see the underlined in the extract below):

T: You know some, some features of fish. For example, how do they breathe? How do they breathe?
Ss: With gills.
T: They *breathe with gills.*
Ss: *Breathe with gills*.
T: How do they reproduce?
Ss: They reproduce *by laying eggs*.
T: *By laying eggs*. And what's on their body?
Ss: (Inaudible).
T: There are scales on their body. We can also say their body is covered with scales. So what is the use of scales? [Lesson 2 Stage 5 ll.356-366]

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She explained why in the interview:

> If I didn't pay attention to their grammar or sentences, they would make too many mistakes and they would forget everything they have learned, so I, I do something to make them remember the key sentences, … and we practice them a lot.

When asked how she helped students practise the language, she said:

> I organize some activities. For example, er, we used the word guessing to consolidate how they, how they master, how they understand the new words. …Not only the meaning… Sometimes I ask them to fill in the blanks, er, sometimes I ask them to answer my questions. We have debating sometimes and we, er, I ask them to work in pairs or groups.

When asked why she also showed the students the word class of the words in the word guessing game, she said:

> If I didn't show them what kind of word it is, for example, hibernate is a verb and hibernation is a noun. If I just tell them the, the definition, they will think they are similar words. [When they need the word] 'hibernate', they will give 'hibernation'.

She also explained why she did not accept single-word answers and how she dealt with students' language errors:

> If they just give one single word, they cannot improve their English. And maybe they will make more mistakes when they give complete sentences. If I can know what kind of mistakes they make, I can correct them.
> If I correct their mistakes every time, they would be frustrated. Er, but if I don't correct their mistakes, they will repeat the mistakes again and

again. … So I need to balance.

I correct their language when it's in a language objective.

When she realized that the students did not understand the word 'changeable' well enough when reviewing the physical features of the five groups of vertebrates in Lesson 2 Stage 1, she explicitly taught the word again in the context of the content:

T: In Xi'an the weather, the climate is usually changeable in Xi'an in spring. OK, so changeable means it keeps changing all the time. We can also say it's changeable. So fish do not have the… constant body temperature. Their body temperature is changeable or changes all the time. And it changes with the… *surrounding environment*.

Ss: *Surrounding environment*.

T: OK, and XXX, er, do reptiles have constant body temperature?

S8: No, they don't.

T: No, they don't. So what kind of body temperature do they have?

S8: They have changeable.

T: They have changeable? They have changeable what?

S8: They have changeable body temperature.

T: Yes, they don't have constant body temperature. They have changeable body temperature. Thank you. XXX, what about mammal? Do they have changeable body temperature?

S9: No. They have, have constant body temperature.

T: Mammals usually have constant body temperature. It means their body temperature doesn't change. They… the temperature stays the same unless you are ill, right? If you have a fever, your temperature will go higher. [Lesson 2 Stage 1 ll.47-66]

Student Achievement

Both the written and oral test results show evidence of learning (see Table 2 for the scores of the written and oral tests). More than half (51%) and more than one third (36%) of the students scored 4 or 5 respectively in Questions 1 and 2 of the written test. Fewer than and about one third of the students (30% and 34%) scored 1 or 2 respectively in these questions. Question 2 is more difficult than Question 1 as it asks the students to explain their classification of bats, which is not a typical mammal. They worked on classifying bats (see Lesson 1 Stage 5 in Appendix) in class but they did not have to explain the classification. The oral test asks a comparably difficult question as Question 2 in the written test. Out of the nine students chosen by the teacher to represent a range of high to low performers, 7 scored 4 or 5.

TABLE 2
Scores and Percentages of Written and Oral Test Results

Written Test Q1 ($n = 47$)		Written Test Q2 ($n = 47$)		Oral Test ($n = 9$)	
Score	No. & % of Scripts	Score	No. & % of Scripts	Score	No. & % of Scripts
5	8 (17%)	5	6 (13%)	5	4 (45%)
4	16 (34%)	4	11 (23%)	4	3 (33%)
3	9 (19%)	3	14 (30%)	3	0 (0%)
2	10 (21%)	2	8 (17%)	2	1 (11%)
1	4 (9%)	1	8 (17%)	1	1 (11%)

The written answer quoted below (about what a bat is and why), which is one of the six scored as a 5 for Question 2, exemplifies the learning of both content and language. The student was not one of the nine selected by the teacher for the oral test. Despite some slight confusion with the content (e.g., skin and hair) and minor language errors, the answer provides a science descriptive report (Llinares, Morton, & Whittaker, 2012) as required by the question, using the four physical features of a mammal to explain why a bat belongs to the group. Also, almost every sentence (except the one on

'temperature' rather than 'body temperature') involves the use of the language of the content as taught in the lessons (underlined in the answer).

A <u>bat</u> <u>belongs to</u> <u>mammals</u>. A <u>bat</u> <u>gives birth to</u> <u>live babies</u>. A <u>bat</u> <u>breathes with lungs</u>. A <u>bat</u> <u>feed milk on its young</u>. A <u>bat</u> is <u>warm-blooded</u> <u>animal</u>. The <u>temperature</u> of <u>bat</u> is <u>constant</u>. A <u>bat</u> is <u>covered with skin</u> and has <u>hair</u> or <u>fur</u>. So I <u>classify</u> it into <u>mammals</u>.

The following extract from an oral test which explains what a penguin is and why, also scored as a 5, shows similar learning (with the language of the content used by the student underlined):

I: Which group does a penguin belong to?
S: It <u>belong to bird</u>.
I: Bird. Why do you classify it as a bird?
S: Because… er because there are many <u>feathers on their body</u> and they are <u>warm-blooded animal</u>. They <u>lay eggs</u> and they <u>breathe with lungs</u>. Their <u>body temperature</u> are <u>not changeable</u>. Er, and… but they <u>don't have scales</u>.
I: Yeah.
S: And they can't fly, they have wing, they can't fly.
I: So why is it a bird?… They have wings, but they can't fly. So why do you still call it a bird?
S: Because he had many <u>feather on their body</u>, and they <u>don't have scales</u>. They <u>breathe with lungs</u>.
[I = Interviewer; S = student; … = pause]

Despite the grammatical errors of missing third person singular, incorrect subject-verb agreement, incorrect singular and plural forms, and incorrect pronouns, the student was able to use the four defining physical features of a bird, expressed in the language of the content taught (as underlined), to orally explain why a penguin is a bird and she was also able to use two of these features to distinguish a penguin from a fish.

Only one out of the nine students used English to answer all the questions in the questionnaire. This seems to suggest that the majority of the students were not fully comfortable or conversant in using English. They were, however, able to write in English for the last question on the new English they had learnt. The following are the answers given by the nine students to the last two questions on the new content and the new English they had learnt from the two lessons (with the number in brackets indicating the number of students giving the answer):

New content
- vertebrates can be classified into five groups (3)
- the characteristics of the five groups of vertebrates (3)
- reproduction, breathing, body temperature and features of animals (3)
- classification of animals (2)
- similarities and differences between different types of vertebrates (1)
- animals can be classified into vertebrates and invertebrates (1)

New English
- be covered with (6)
- feed on (4)
- can be classified into (3)
- give birth to live babies (3)
- lung (3)
- gill (3)
- lay eggs (2)
- breathe with lungs (2)
- breath with (2)
- scales (2)
- cold-blooded (2)
- warm-blooded (2)
- mammal (2)
- hibernate (2)
- fins (2)
- reproduce (1)

It is worth noting that none of the answers about the new content and the new English learnt is incorrect or irrelevant. These answers, together with the results of the written and oral tests and some of the student responses in class shown in the lesson transcript, provide evidence of learning of both content and language by the majority of the students. This learning is new to the students as evidenced in the fact that 1) the language law in China requires the school curriculum to be taught in Chinese, thus the content chosen for the CBLT classes cannot be part of the formal school curriculum; 2) both the teacher and the students confirmed that the learning was new.

Discussion

The case study reported in this paper set out to document a coherent account of how a teacher can implement content-language integrated teaching to effectively support students' learning at the middle school level, using the three principles proposed in Kong and Hoare (2010) as a framework. The teacher's planning and teaching has a significant role to play in helping the students learn the content and the language identified. This is suggested by the match between the content and language learning objectives identified by the teacher in her planning and teaching, and the students' ability to produce to a large extent the same content and language in the written and oral tests and the last two questions in the questionnaire. This success provides support for the two-tier framework, presented in Table 1, derived from the three principles in Kong and Hoare (2010) and further developed from the findings of the study. The framework serves as a coherent pedagogical guide for content-language integrated teaching at the planning and classroom implementation levels. The findings also suggest some possible pedagogical practices within each principle, encapsulated in Table 3 below. As this study only involved a language-trained teacher, the refinements suggested for the framework also take into consideration the possible needs of content-trained teachers or more content-focused contexts.

TABLE 3
A Two-tier Pedagogical Framework for Content-language Integrated Teaching (with possible pedagogic strategies)

Principle	Planning	Teaching	Possible Pedagogical Strategies
Start from the content	Identify the content learning objectives	Organize the content revolving around the content learning objectives	Using a spiral lesson structure to allow revisiting of content at increasingly greater depth
Integrate content and language	Identify the language of the content	Explain/help students learn the content using the language of the content	Using/modelling the language of the content to teach the content Requiring students to use the language of the content to learn the content at increasingly more accurate and elaborate levels Repeating and expanding on students' language use to reinforce learning
Focus on the language	Identify the language learning objectives	Explicitly teach/help students achieve the language learning objectives in the context of the content	Making language objectives as specific as possible Teaching specific language forms when appropriate Correcting students' errors when appropriate (e.g., with language specified in the language objectives)

The framework accords with the pivotal role of content in CBLT recognized in Brinton, Snow, and Wesche (2003) as 'the concurrent study of language and subject matter, with the form and sequence of language

presentation dictated by content material' (p. ix). The success of the two lessons studied relies not only on the teacher's awareness of the need to 'start from the content' (Principle 1) at both the planning and the teaching levels, despite being a language-trained teacher, but also on her recognition of the pivotal role of the content in determining the lesson objectives and structure, and how the lessons are taught. The content objectives identified in her planning determine and dictate the language objectives, which are, to a large extent, 'content-obligatory language' (her language objectives) with some 'content-compatible language' (e.g., 'bury, hibernate, fins' that she mentioned in the interview and used in class) (Snow, Met, & Genesee, 1989, p. 205). In the teaching, she structures the lessons in clear stages spiralling around the content objectives to revisit the content at increasingly greater depth to maximize learning.

The teacher's recognition of the pivotal role of the content and her ability to clearly identify the language of the content in her planning, probably in part because of her language-trained background, provide her with the support to integrate content and language (Principle 2) in her teaching. Within a mainly teacher-centered but interactive classroom mode, she helps the students learn the content (the four defining features of the five groups of vertebrates and more characteristics of fish and shark) by using and requiring the students to use the 'necessary' language of the content throughout the lessons. This, together with the spiral lesson structure, provides the students with multiple opportunities to learn and revisit the content and the language of the content at increasing depth to facilitate their content-language learning. She supports the students' use of the language of the content using language teaching strategies such as modeling the language use for students, demanding gradually more accurate and elaborate language use from students, and repeating and expanding on students' language use. These language teaching strategies, that have been shown to work well in CBLT classrooms as discussed in the section on 'The need for pedagogical frameworks' above, can be used in this part of the two-tier framework to 'help students learn the content using the language of the content'. The word 'explain' has been

added under 'Principle 2 Teaching' in the framework because it may have more relevance for content-trained teachers at the middle school level and beyond. At this level the demands of the curriculum require teachers to take a more prominent role in explaining content to students. How content-trained teachers can use the language of the content to explain and help students learn the content is an area that needs further investigation.

The distinction between identifying the language of the content (Principle 2: Planning) and identifying the language learning objectives (Principle 3: Planning) is that the latter should focus on language that students have yet to learn (e.g., language new to students or language that students have not fully mastered) whereas the former may involve language that students can already use. In the unit of learning in this study, for example, 'belong to' is part of the language of the content but not a language objective. The teacher and the students use it (as evidenced in the findings presented above) but the teacher does not include it as a language objective and the students do not include it in their questionnaire responses when asked about the new English they have learnt. Because of this distinction and because of the recognition of the need to explicitly support language learning instead of simply using the language in CBLT classrooms (Lightbown, 2014; Lyster, 2007), Principle 3 is needed at both the planning and teaching levels. The teacher in this study is able to identify very specific language forms as the language objectives in her planning. She then knows what language to teach explicitly and what help to give to the students to learn the language. She also knows which student language errors to correct or not. It is difficult to divide what happens in any classroom into distinct parts. This teacher often manages to merge Principles 2 and 3 in her teaching: she manages to 'explicitly help the students achieve the language learning objectives' as she 'helps the students learn the content by using the language of the content'. There are incidents, however, where she explicitly teaches a particular word or language form identified as a language objective (e.g., when she explains the word 'changeable'). Her language-trained background is a useful support. How content-trained teachers can explicitly teach/help students achieve the language learning

objectives needs to be investigated. Also, the very specific language forms identified as language learning objectives provides support for the explicit teaching of language and correction of students' errors. It is worth stressing, however, that it may not always be possible to identify specific language forms for the content especially at higher year levels where there is more need to construe complex content in correspondingly complex texts. The effects of the nature of the language learning objectives on the explicit teaching of the language therefore also require further research.

This study focuses only on the planning and teaching of two lessons. As can be seen in the samples of students' written and oral production, there are inaccuracies even in the best work. To support students' language development within and across the years, there needs to be a systematic approach in identifying and planning the language objectives to ensure opportunities for progression. Systemic functional linguistics (SFL), based on Halliday's (2004a, 2004b) work on how language makes meaning, has been recognized as a possible effective resource to support this planning (Christie & Derewianka, 2008; Coffin, 2006; Lightbown, 2014; Llinares, Morton, & Whittaker, 2012; Schleppegrell & de Oliveira, 2006). Schleppegrell and de Oliveira (2006) found that teachers without a language teaching background could be helped to use SFL to analyze the content of texts, which is a way to identify the language of the content from which language objectives are derived. Kong (2008) proposes to connect content learning objectives to language learning objectives through knowledge structures and text structures. Examples of knowledge structures are classification (which the teacher in this study identified as a content learning objective), cause-effect and hypothesis. They are knowledge relationships and cognitive processes students have to learn to think in and they are connected to language use in that there is the language of classification, the language of cause-effect and the language of hypothesis etc. This language use can be organized as a text with a structure (i.e., has a text structure), which is what Schleppegrell and de Oliveira (2006) helped teachers to analyze in history texts. Dalton-Puffer (2013) also recognizes the role of these knowledge structures, which she calls

'cognitive discourse functions', in conceptualizing content-language integration. Within the two-tier framework proposed in this paper, therefore, resources such as SFL and knowledge structures can be applied to help teachers identify the language of the content. Research into how this can be "actually appropriated, understood and carried out", to use the words of Pessoa et al. (2007, p. 103) again, may shed more light on CBLT pedagogies. The teacher in this study was able to adopt the three principles to support students' content-language learning because of her language awareness, content understanding and her second language proficiency. Further research into the level of competence in these three areas to enable teachers to adopt the framework for content-language teaching is also needed. This will have implications for teacher training and professional development.

Conclusion

The recognition of the pivotal role of the content, the teacher's use of the language of the content to help the students learn the content, the demand on the students to use the same language to learn the content and thus the language of the content, and the explicit help given to the students to learn the new language have all contributed to the success of the teaching in this study. Table 3 reflects these pedagogical strategies and practices in a two-tier pedagogical framework that can provide a guide for content-language integrated teaching, and related professional development training. While the framework may seem to be more general and less elaborate than other existing CBLT pedagogical frameworks (e.g., the SIOP® model), the simplicity may function as a pedagogic advantage in that it is a readily accessible heuristic to teachers, especially middle-school content-trained teachers where the initial focus on content acknowledges their main concern (Kong, 2009).

Further research into the following areas is needed to ascertain the effectiveness of the framework:

1) how teachers, especially content-trained teachers, can be helped to identify the language of the content and the language objectives for individual lessons/units and across units/years

2) what kinds of language objectives better support the explicit teaching of language, especially at higher year levels

3) how the framework can support content-trained teachers' teaching, for example, in their use of the language of the content to explain and help students learn the content, and in their explicit teaching of the language objectives

4) the level of language awareness, content understanding and second language proficiency needed for teachers to be able to adopt the framework

5) whether and how the framework applies to CBLT at the primary level

6) whether and how the framework applies in a variety of CBLT contexts.

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Appendix

Stages in the Two Lessons

Lesson 1

1. Revision of the use of keys for classification – there are 2 groups of students in class: boys and girls, based on the key of sex; there are 2 groups of living things: animals and plants, based on the keys of movement and food production etc.; animals are divided into vertebrates and invertebrates based on the presence/absence of a backbone [5.5'; 41 turns; ll.4-70]

2. Word guessing game – with students taking turns to come to the front facing the class with back to the board, teacher shows a word and a volunteer describes/explains it for the student to guess the meaning, words are related to what they have learnt about classification [11.5'; 51 turns; ll.71-161]

3. Students sharing in groups for 3 minutes their preview of the 5 groups of vertebrates – their physical features and an example, followed by teacher-led class sharing, interspersed with class reading from the textbook the features of each group [16'; 132 turns; ll.162-331]

4. Teacher showing a chart comparing the features of the 5 groups with students individually taking turns to describe the features of each group using the chart [7.5'; 61 turns; ll.332-416]

5. Group discussion (2 minutes) on how to classify 5 things with wings based on keys, followed by teacher-led class sharing [8'; 72 turns; ll.416-501]

6. Rounding up of lesson and preparation for next lesson with a question ('How do cold-blooded animals keep themselves warm?') for students to prepare [0.5'; 2 turns; ll.501-504]

Total: 49'; 354 turns; 504 lines

Lesson 2

1. Revision of the chart showing the physical features of the 5 groups of vertebrates with students describing a feature at random [5'; 43 turns; ll.2-66]

2. Teacher showing her classification of the 5 things with wings and a student group's classification different from hers from the last lesson, with students explaining the keys used [6'; 58 turns; ll.67-144]

3. Students classifying, individually by responding to the teacher's questions, eight other living things (earthworm, ant, butterfly, snake, shark, whale, monkey, duck) and another set including non-living things (glass, angelfish, rabbit, turtle, whale, kangaroo, pigeon, spider, butterfly, turkey, penguin) [7'; 80 turns; ll.144-241]

4. Teacher-led sharing of the preview question on 'How do cold-blooded animals keep themselves warm?', with students reading aloud from PPT on ways cold-blooded animals keep themselves warm [9'; 74 turns; ll.241-354]

5. Teacher-led sharing on interesting facts about fish – revision of features of fish, with students reading some information about fish, three parts of fish (gills, scales, fins) and their functions [7.5'; 63 turns; ll.355-445]

6. Teacher giving a riddle about sharks for students to guess – fish with thorns (not scales), give birth to live babies (not lay eggs), followed by more interesting facts about sharks [11'; 108 turns; ll.445-587]

7. Setting homework – students write a 150-word passage about the features of one group of vertebrate [1'; 4 turns; ll.588-600]

Total: 46.5'; 424 turns; 600 lines