Code-scaffolding: A Pedagogic Code-switching Technique for Bilingual Content Instruction

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ABSTRACT

This article addresses the value of code-switching during bilingual content instruction. The linguistic data were collected during a larger ethnography of communication case study of the language practices of three bilingual Mandarin/English speaking science-content teachers working as they negotiate meaning and instruction for recently arrived non-traditional Chinese immigrant high school students. Through a pedagogic analysis of naturally occurring code-switching practices, the author argues that code-switching is indeed a pedagogic tool used by bilingual teachers in the act of making content comprehensible and as such, it is similar to scaffolding devices regularly used in monolingual education.

INTRODUCTION

> If I speak English to these kids then they won't understand me. If I speak Chinese then they won't understand the text and they won't be prepared. I just don't know what to do. So I speak both (science content-subject Mandarin/English bilingual teacher, personal communication, March 19, 2006).

Immigrant students entering the U.S. educational system during high school face linguistic pressures that can negatively impact their educational experiences and ultimately their personal academic success. These students must master both language and content within an abbreviated time period so that they can successfully pass standardized tests that act as gatekeepers to high school graduation and further education.

Language allocation by bilingual programming type may not always be possible under the growing constraints placed on teachers to prepare their students for testing and assessment. Traditionally, the bilingual program model that a school selects dictates the language of instruction at any given time, day, or subject. High schools with large populations of one linguistic group often select a transitional bilingual program because it offers intensive English as a second language courses while content subjects are being taught in the native language. In theory, as the English level of the student increases, the time spent in content instruction in the native language decreases until the student can be mainstreamed. The rationale for this program model has been that students should receive native language instruction in the content subject in order to support content acquisition at grade level while they learn English as a second language (NYCDOE, 2004). However,

language allocation by content-subject becomes problematic when: 1) the students enter the school system at varying levels of English proficiency and prior school experience throughout the school year; 2) there is a lack of available bilingual or native language content-subject textbooks and, consequentially, English textbooks written above the English level of the students are used; and 3) there is increasing pressure placed on teachers and administrators to improve students' English competency within the subject strands for mainstreaming and testing purposes. Thus, in bilingual instructional practices, strict language separation or language allocation often gives way to the use of two linguistic codes within one learning event as indicated by a science content-subject Mandarin/English bilingual teacher in the introductory quote.

If bilingual teachers, such as the one quoted above, are naturally code-switching in content-instructional time, and if they are actively encouraged to do so through policies such as the New York City 2004 (reissued in 2008) Language Allocation Policy Guidelines for Transitional Bilingual Education (TBE) programs, then the question of how to use code-switching to optimize pedagogic outcomes should be addressed and more openly investigated and discussed in the literature on bilingual educational practices. However as Ferguson (2003) points out, the current literature on bilingual education is openly hostile to and often discourages the use of code-switching. Bilingual instructional methodologies that include code-switching are often considered ineffective practice and a form of subtractive bilingualism (Cummins & Swain, 1986; González and Maez, 1980; Milk, 1981; Wong-Fillmore & Valdez, 1986). Models that actively support code-switching for pedagogic reasons such as the New Concurrent Approach (Jacobson, 1979, 1982; Faltis, 1996) are also criticized in the literature on bilingual teaching practices (Wong-Fillmore & Valdez, 1986) and, as Garciá (2008) states, represent an artificial use of bilingual modes that makes it difficult for teachers to implement in practice. In contrast, studies that examine naturally occurring code-switching in the classrooms describe both positive and negative aspects of switching during instruction (Adler, 1998; Arthur, 1996; Camilleri, 1996; Setati, Adler, Reed & Bapoo, 2002; Van de Walt, Mabule, & De Beer, 2001). Among the positive aspects mentioned are the ability to make the target language more accessible and the ability to focus attention, clarify, or reinforce lesson material. The negative aspects of classroom based code-switching focus on the power dichotomy between the use of the different codes and the possible marginalization of a language and its speakers. Other than Van de Walt, Mabule, and De Beer's (2001) notion of responsible code-switching, where any act of planned or unplanned switching

by the teacher results in stimulating comprehension of cognitively challenging content, little to no guidance has been offered to help teachers determine valid judgments of code-switching practices. Therefore, I will first outline the pedagogic reasons that teachers in this study code-switched during content instruction. I will then argue that pedagogic code-switching in the form of code-scaffolding is a natural part of bilingual instruction no different than monolingual scaffolding techniques. Finally, I will offer a definition for code-scaffolding that will help teachers working within similar TBE programs determine better code-switching practices in content-subject instruction.

METHODOLOGY

The linguistic data presented in this paper were collected during a larger ethnography of communication case study (c.f. Fennema-Bloom, 2008) of the linguistic practices of three bilingual science-content teachers. The high school selected for this study is located on the outskirts of Manhattan's Chinatown. It is an alternative Mandarin/English bilingual high school operating a TBE program as outlined by the New York City Department of Education's Language Allocation Policy (LAP) Guidelines of 2004. The school primarily educates Chinese students between 17 and 21 years of age, who are either recent immigrants or have experienced difficulty in more traditional high school programs. The older age of students makes preparing them in both the language and content an even greater concern for the teachers and students who are aware that this may be the students' last chance to acquire a publically funded high school diploma that is required for employment and higher educational opportunities within the United States.

The five science content teachers at this school were interviewed to determine their perception and use of code-switching in the classroom. All but one reported that they use both languages regularly as a matter of necessity and indicated no negative attitudes toward code-switching. The teacher who reported no use of code-switching in her classroom expressed concern over the LAP guidelines to incorporate more English through English as a second language (ESL) scaffolding and methodologies (c.f. LAP Guidelines (2008), p. 6) into traditional monolingual instructional time. Her concern rested in the possibility of the use of English interfering with the students' Mandarin language development, especially among those non-Mandarin dominated speakers with interrupted formal education. However, linguistic data collected during instructional time showed that this teacher did code-switch at 34% of the total switches calculated in this study but with the lowest recorded use beyond lexical insertions. From the five science teachers, three were selected for in-depth participation based on their use of Mandarin Chinese and English as the primary languages of instruction, similarity of their lesson content, and the amount of verbal delivery and discussion that transpires during class.

Though the focus of this study is on the teachers' use of code-switching in the classroom, the students were included as dialogic participants. In the year of this study 81.3% of the school population was considered recent immigrants with their place of birth listed as follows: China at 76.2%, Hong Kong at 1.5%, and Taiwan at .5% (NYCDOE, 2006). In China, or more specifically in the People's Republic of China (PRC), there are 80–100 distinct mother tongues, including dialects, regionalects, and minority languages (Bass, 1998; Chen, 1996; Hong, 1998; Lin, 1997; Stites, 1999) and though the PRC has a nine year compulsory education system with Mandarin as the language of instruction, age of attendance, length of attendance, and educational opportunities vary from province to province and from rural to urban areas (Lamontagne, 1999). However, the fact that there are so many different mother tongues, with Mandarin as a universal government enforced language, creates an atmosphere conducive to social acceptance of code-switching in community practice and may be a reason that teachers and their students, as noted below, find code-switching between English and Mandarin acceptable.

Through a school-wide survey as well as during small focus groups conducted during the pilot of this study, students were asked why they chose this alternative high school. One informant reported,

> The teachers here check to see if we are following the material. They'll ask us what they said allowing us to say it in Chinese or they'll ask us what's this in English. We can also ask them what some Chinese word is in English or what our English vocabulary word is in Chinese. It's really helpful. I think it helps me learn and improve my English too. My other school didn't have bilingual teachers. I got lost and couldn't follow what they were saying (high-school transfer student, October 10, 2005).

This comment echoed what others within the focus groups had stated and was in line with the survey results which indicated that students appreciated the use of both languages in the classroom as it helped make what they were learning in their content class and through their English textbooks more comprehensible.

Classes designated for observation were chosen at the discretion of each selected teacher according to the following criteria: similarity of class size and language level of the students across all three classes. Ten hours of classroom interaction per teacher across one curricular unit of study were audio-visually recorded for a total of 30 hours and the linguistic data analyzed for acts of code-switching between Mandarin Chinese and English. The data were then transcribed at points before, during, and after the code-switch occurred in order to capture turn-taking practices and the interactional practices between the two languages as the conversation was constructed (Wong & Waring, 2010). All speech samples in this paper will be presented in Mandarin traditional characters and English, a gloss for the characters is provided in pinyin (the Romanization of the Chinese Characters adopted by the People's Republic of China), followed by a direct translation in italics.

In this study, language is seen as a process of social interaction (Erickson, 2004; Halliday, 1978); as a process of social interaction,

language cannot be, as Hymes (1974) emphasized, separated from "how" and "why" it is used. Though the linguistic data underwent an initial analysis using a conversational analysis framework, a functional analysis of pedagogic purposes was chosen to better capture the pedagogic intent of the code-switch within the construction of a learning event. Analysis on a functional level allowed the inclusion of educational artifacts such as the use of the English textbook, lesson power points and handouts, use of the blackboard, and stated lesson objectives and aims, etc. that also help to construct the learning event. Inclusion of these artifacts in analyzing the code-switched speech event provides a more holistic view of the pedagogic purposes behind classroom-based code-switching.

ANALYSIS AND FINDINGS

From a type token analysis, the amount of code-switching identified in this study comprised 3,184 separate counts of switching over the 30 hours of recorded classroom interaction (10 hours per teacher). Two types of lexical insertions emerged: habitual discourse markers (such as "okay" or "you know") at 696 out of 1,486 instances and content-subject vocabulary (such as "guard cell" or "atom") at 1,150 instances. Though habitual discourse markers may represent code-switching, lexical insertions of content-subject vocabulary were more frequently switched. Moreover, these lexical insertions represented science-based vocabulary in the English-language textbook and generally occurred within a Chinese matrix sentence. Though one-word science terminology insertions, as intra-sentential (mid-sentence) switches, can also be considered code-mixing (Ritchie & Bhatia, 2004; Singh, 1985), a better explanation of the use of these English vocabulary inserts would be that these terms on first introduction are acts of code-switching. Then, through frequent use they become loanwords that have passed into the lexicon of the class as a community of practice (Romaine, 1995, 2004).

Pedagogic Functions

Categories for analysis under the functional level of pedagogic use were adapted from a framework provided by Merrit, Cleghorn, Abagi, and Bunyi's (1992) four types of classroom-based code-switching and Guthrie's (1982) five communicative functions of switching. In Merrit et al. (1992) types of classroom based code-switching included four categories: 1) reformulation across codes with no new instruction, 2) code-switching as the content of the activity, 3) translation or word substitution within a sentence, and 4) international particles. Guthrie (1982) categorized code-switching functions as 1) translation, 2) inclusion (we-code), 3) procedures and directions, 4) clarifications; and 5) checks for comprehension.

Of the 3,184 instances of code-switching found in this study across all three teachers, 696 of these switches were habitual with no pedagogic intent. The remaining 2,488 switches fell into the following four categories: instructional for content acquisition at 1,122 switches, reformulation at 404 switches, instructional for language acquisition at 348 switches, and facilitation at 614 switches (see Table 1).

Table 1: Coding Categories of Pedagogic Functions			
Category	**Description**	**Intent**	**Total Switches**
Type I: Instructional for Content Acquisition	Content instruction is moving along between the two codes.	To progress through the content where one language mode or the other may employed, depending on the targeted vocabulary, use of instructional material, set up of the instructional intent or activity.	1,122
Type II: Reformulation	Content is reformulated or translated with no new information and no new instruction.	To check understanding and make content comprehensible by asking for or offering concurrent translations of text or speech.	404
Type III: Instructional for Language Acquisition	Content instruction is usually disrupted or postponed in order to draw attention to linguistic development.	To develop metalinguistic abilities (semantic, syntactic, phonemic, morphological) primarily in English and beyond the normal scope of the content subject instruction.	348
Type IV: Facilitation	Switching is a classroom management/ facilitation device.	To facilitate classroom management switches as a way of including more English into the daily routines, as an evaluation device, and/or used to create in/out group solidarity and participation.	614
Type V: Habitual	Switching is a product of the teachers' individual discourse patterns as bilingual speakers.	This category has no direct pedagogic aim. The switch tends to be an idiosyncratic habit of the teacher and has no direct instructional intent.	696
Total Code-Switching Count			3,184
Switches for Pedagogic Functions			2,488

Instruction for Content Acquisition

The coding category instruction for content acquisition, with 1,122 switches, was created to note progress in content instruction. One language mode or another was employed depending on the target vocabulary, use of instructional material, and/or the setup of the instructional intent or activity. Content instruction progresses across the codes without interruption or repetition. Thus content instruction is the aim or objective of the speech act, and the teachers used one or both codes to achieve their aim. The following speech sample illustrates the kind of switching that was included in the category of instruction for content acquisition.

In this example the teacher was going over work a student had written on the board. Her focus was first to help them understand that within the student's solution the notational marking was missing, and also that there was a standard formula that the students should use in solving their equations.

Speech Sample 1
Teacher:

(1) 太好了,
Tai(4)hao(3)le(0)
Great

(2) 比熱用什麼字母代表?
Bi(3)re(4) yong(4) she(4)ma(0) zi(4)mu(3) dai(4)biao(3)?
What letter represents specific heat?

(3) 比熱, 用一個這樣的字母代表,
Bi(3)re(4) yong(4) yi(2)ge(0) zhe(4) yang(4)de(0)zi(4)mu(3)dai(4)biao(3),
For example use this kind of letter to represent it

(4) 我在這裡寫吧, 好不好,
Wo(3)zai(4) zhe(4)li(3) xie(3)ba(0), hao(3)bu(4)hao(3),
Let me write it here, okay

(5) notation, Cp, notation 就是用字母,
jiu(4)shi(4) yong(4) zi(4)mu(3),
just use this letter

(6) 這個字母就是代表比熱,
Zhe(4)ge(0) zi(4)mu(3) jiu(4)shi(4) dai(4)biao(3) bi(3)re(4),
This letter represents specific heat

(7) 你知道我要你的公式是什麼東西嗎?
Ni(3)zhi(1)dao(4)wo(3)yao(4)ni(3)de(0)gong(1)shi(4)shi(4)she(2)ma(0) dong(1)xi(1) ma(0)?
Do you know what is the formula that I want you to use?

(8) 譬如說, 什麼公式, 譬如說我, 譬如說,
Pi(4)ru(2)shuo(1), she(2)ma(0) gong(1)shi(4), pi(4)ru(2)shuo(1) wo(3),
pi(4)ru(2)shuo(1),
For example, what formula, for example I, for example,

(9) 一下,什麼叫公式,
Kan(4)yi(1)xia(4) she(2)ma(0) jiao(4) gong(1)shi(4),
Look at it, what is formula

(10) 些都叫公式 來得, 對吧,
Zhe(4)xie(1) dou(1) jiao(4) gong(1)shi(4) lai(2)de(0), dui(4)ba(0),
These are all called formulas, right

(11) 要是每一個一百八的人吃飯吃恩什麼叫公式,
Yao(4)shi(4) mei(3)yi(1)ge(0) yi(1)bai(3)ba(1) de(0) ren(4) chi(1)fan(4) chi(1) . . . en(1) . . . shen(2)ma(0) jiao(4) gong(1)shi(4),
If every one-hundred and eight people eat . . . (sound) . . . What is a formula?

(12) 這些都叫公式來得, 對不對
Zhe(4)xie(1) dou(1) jiao(4) gong(1)shi(4) lai(2) de(0), dui(4)bu(4)dui(4)
And these are all called formulas, right

(13) 譬如說 density equal to the mass divided by volume,
Pi(4)ru(2)shuo(1) density equal to the mass divided by volume,
For example, density equal to the mass divided by volume,

(14) rate of change, the change of new variables divided by five.

(15) okay, 怎麼樣, 公式解出來沒有? Student's name? 上來寫吧.
Ze(3)ma(0)yang(4), gong(1)shi(4)jie(3)chu(1)lai(2)mei(2)you(3)?
Student's name? shang(4)lai(2)xie(3)ba(0)
Okay, so how did it go, did you solve the formula? Student's name? Come write it.

In line (1) the teacher acknowledged the correct answer. In line (2) she asked indirectly for the missing notation mark by asking what letters were missing in the word that specified the specific heat. Then in line (3) she reformulated within the same language the question in line (2). In line (4) she told the students that she would write it in. Between line (4) and line (5) she went to the board to write "Cp" (specific heat capacity) into the answer. As she wrote she stated "notation, Cp, notation" in English as a content insertion and continued to explain in Chinese that these were the letters to use. Line (6) is an extension of line (5) where she states that these were the letters that specify specific heat. She then asked the students, in line (7), if they knew the formulae she was requesting. In line (8) she offered a false start in an example, and in line (9) she redirected her focus on the word "formula" asking what it was called. In line (10) she pointed out other formulae on the board explaining that they all are formulae. In line (11) she focused on one formula on the board that calculates the food intake ratio and then stopped once again to ask for the definition of a formula. In line (12) she once again focused on the formulae written on the board stating that they all were formulae. In line (13) she began to give an example, and it was here that she code-switched into English to deliver the formula for density. This formula was presented orally and in written form on the board in English from the switch in line (13) through line (14). At line (15) she switched back into Chinese to ask if there were other formulae that could be used and then called a student to come to the board.

In this example two content switches into English were made within the learning event: in line (5) holding an English content insert and in line (13) where the switch was made to give the formula in English as the teacher wrote it in English on the board. In line (15) she switched back into Chinese to facilitate student participation in providing alternate formulae that could have been used. At no point was the content repeated in the second code, nor was information suspended or disrupted as the teacher explained the needed notation, the definition of a formula or the particular formula she wanted them to know. The content insert of line (5) was made to draw their attention to the alphabetic notation needed in the problem's solution. With regard to a content insertion in line (5), it can be argued that the insertion of English at this point is not an act of code-switching between English and Chinese. Rather, it is a use of an international mathematical marker or "loan word" that may be used even in monolingual Chinese instruction since her explanation of the letters continued in Chinese in line (6). However, without documentation that this could be considered a loan word of a mathematical marker for the purposes of this research it was counted as a code-switching event. The switch to English in line (13) for the formula could have been delivered orally in Chinese as the students had the formula written in Chinese on the top of their homework assignment that was in front of them at the time of this dialogue. However, the use of English followed the English formula that the teacher provided in writing on the board and represented the conceptual information the students would need to solve future equations in their English-language textbook. After delivering the formula she switched back to Chinese to facilitate student participation in determining alternative formulae they might have found to solve the equation.

Reformulation, with 404 recorded instances, was utilized to reformulate or translate content with no new information and no new instruction provided. For example, a common use of reformulation was to restate a question in another language when no student response was given. The following example illustrates this.

Speech Sample 2

Teacher:

(1) yeah, how do you calculate the heat? [pause] Remember? [pause]

(2) The change of heat, what's the change of heat? [pause]

(3) 什麼叫做溫差?
She(2)ma(0) jiao(4) zuo(4) wen(1)cha(1)
What do you call temperature differentiation?

(4) 差什嗎麼意思阿
Wen(1)cha(1) shen(2)ma(0) yi(4)si(1) ah(0)
What does temperature differentiation mean?

(5) What is the change of the heat? What does it mean?

In line (1) the teacher asked the initial question. When no one answered her, she recast the question in line (2), still maintaining

English. When she still received no answer, she changed the code, recasting the question again in lines (3) and (4). Finally, in line (5) she switched back to English to state the question a final time.

The teachers also used switches in the category of reformulation to ask for a specific item or passage to be translated by the student; or to translate, rephrase, or recast the text, or a student reply. Reformulations of all the categories most resembled the concurrent translation approach in bilingual methodology. However, unlike the concurrent translation approach, instead of using reformulation to impart information, it was used to reinforce or check comprehension on an individual or group level. Thus, the primary pedagogic function of the category of reformulation was sustaining full-participation in the comprehension of difficult concepts or textual information so that the teacher could proceed with instruction.

Instruction for Language Acquisition

The category, instruction for language acquisition, at 348 instances, was utilized when instruction of the content was briefly suspended in order to support linguistic or metalinguistic development. These switches often occurred to explain a semantic, syntactic, phonemic, or morphological feature of a science vocabulary word and its meaning in relations to common usage that the students may encounter outside of a science context. Furthermore, the switches in this category often paired with the teachers' concerted efforts to develop the students' vocabulary. Such efforts, if done monolingually, would correspond to Walqui's (2003) definition of bridging as a scaffolding device by using metaphoric teaching and/or semantic mapping to increase the students' comprehension of a vocabulary word in context and in life. In essence, the content is postponed for linguistic scaffolding with the teacher's talk targeting an element for language acquisition. In the following example, the teacher suspends content instruction on the parts of a microscope to direct the students' attention to the homonyms: *course* and *coarse*.

Speech Sample 3

Teacher:

(1) This is the coarse adjuster. [points to an overhead projection of a microscope]

(2) 這個 coarse有點像你們修課….
Zhe(3)ge(0) coarse you(3)dian(3) xiang(4) ni(3)men(2) xiu(1)ke(4)…
This "coarse" resembles the word for class subject….

(3) 也是 course, 對不對，拼法也是不同….
Ye(3) shi(4) course, dui(4) bu(2) dui(4), pin(1)fa(3) ye(3) shi(4) bu(4)tong(2)
It is also "course," right, but they have different spellings

(4) 發音一模一樣
Fa(1)yin(1) yi(4)mo(2) yi(2)yang(4)
The pronunciation is the same.

Facilitation

Facilitation comprised 614 switches and occurs when the switch takes place in conjunction with the teachers' switch in roles from instructor to facilitator. Thus, this category includes switches made to facilitate classroom operations that maintain or create movements toward the next learning objective such as routines, behavioral management, expressive language that creates in/out group solidarity, and instructions and/or directives. These switches were also used to draw attention to a new focus or learning event, for evaluative purposes, and to facilitate classroom discourse and participation. The following example occurred during a daily routine referred to as the "Do Now," which begins each class. At the time that the switch occurred the teacher did not have the full attention of the class, thus the switch in line (2), though a recast of the initial English elicitation, serves not as a reformulation for the sake of comprehension, but rather as a facilitation device to draw the students' attention to the task at hand.

Speech Sample 4

Teacher:

(1) rate of change, the change of new variables divided by five.

(2) okay, 怎麼樣, 公式解出來沒有? Student's name 上來寫吧.

Ze(3)ma(0) yang(4), gong(1)shi(4) jie(3)chu(1)lai(2) mei(1)you(3)? Student's name Shang(4)lai(2)xie(3) ba(0).

How did it go, did you solve the formula? Student's name, come write it.

Switches within the category of facilitation were also used as a way of including more English into the instructional time by the repetitive use of common English words to mark movement through daily routines. These routines were easily adapted to English switches because of the repetitive nature of classroom management and the more simplistic structures and vocabulary of the students' basic interpersonal communication skills (BICS), thus phrasal switches such as "pass your homework in," "quiet please, the bell rang," and "get into your study groups" etc. were encouraged by the administrators in this site.

Habitual

As seen in Table 1, habitual, the fifth category did not have any direct pedagogic implications but rather illustrated the teachers' language use as members of a bilingual community. In the linguistic data collected for this study, 696 instances of habitual code-switching occurred on a lexical level. The data were coded as habitual if the event adhered to one or more of the following reasons. First, the switch was a conversational product and not a topic/content-generated product and/or idiosyncratic to the individual teacher. Second, no evidence was recorded in the data that would indicate that the translated equivalent was used. For example, the word "credit card" was used by one teacher to indicate her extra credit/bonus point system. Third, the switch is a discourse marker or international participle that is idiosyncratic to the individual teacher such as the word "okay" or "ya know."

Code-Scaffolding

The teachers' use of pedagogic code-switching reflects the two prevalent conditions in which these bilingual teachers work: 1) availability of appropriate science content material; and 2) New York City's push to improve students' use of English in content area subjects, as seen in the Language Allocation Policy Guidelines for TBE programs. The textbooks that are available to these teachers are written in English at levels well beyond the English reading level of the students. Teachers at this site are also educating recently arrived non-traditional students in content material at a level the students may not have acquired or experienced in their prior education. The school's 2005–06 annual school report indicates that 81.3% of the school's population were recent immigrants, with 78.2% coming from provinces/regions with compulsory Mandarin education but where Mandarin may or may not have been the students' first language (NYCDOE, 2006). Therefore, the sophistication of the English used in the textbooks and the science curriculum, as well as the Mandarin used in instruction may be beyond the level of the students in these courses, yet in 2006, 95.5% of those who sat for the Regent's Living Environment test and 66.9% of those who sat for the Regent's English test passed with a 65–100 percent score (NYCDOE, 2006). The students' success rate given their abbreviated exposure to New York City's science curriculum and English content standards is quite high. The teachers use English textbooks and supplement their Mandarin language instruction with English through pedagogic code-switching. In effect they are acting as academic brokers (Arthur, 1996; Lin, 1996) to the content written in English that the students may not be able to access on their own. Instructionally, their switches marked points where the content would be better received by the students in one mode or the other and thus runs parallel to the way monolinguals would switch register to scaffold ideas and concepts in a monolingual environment. Like their monolingual peers, the bilingual content teachers' primary concern is with the development and understanding of science content that will be tested in the Regent's Exams. In order to facilitate learning, these bilingual teachers are using instructional resources, such as a particular linguistic code at their disposal, to link the new concepts and ideas to the students' prior knowledge.

The alternations between languages, though acts of code-switching, were presented through the analysis of the pedagogic functions of teacher talk to illustrate the pedagogic uses of code-switching in bilingual content instruction. However, in the communicative practices of bilingual speakers they may be better described as bilingual translanguaging (García, 2008). García describes translanguaging as a multiple discursive practice whereby a bilingual speaker employs two or more languages to facilitate communication. In facilitating communication in a classroom, the bilingual teacher translanguages in order to negotiate meaning between three different participant groups: the teacher, the students, and the text. By doing so she helps students make sense of the world and the knowledge being conveyed, and she forges connections between existing schemata (linguistic and content knowledge) in the students' background/prior

knowledge. Therefore, acts of translanguaging are nothing more than a form of scaffolding (Walqui, 2003) and as such, should be considered a viable teaching tool.

For example, the following speech sample illustrates the introduction of a textbook/subject-based vocabulary word. The teacher draws upon metaphoric teaching, a component of the scaffolding device Walqui (2003) refers to as bridging.

Speech Sample 5

Teacher:

(1) 這叫一個 stomate [points to the picture of the stomata]
Zhe(4) jiao(4)yi(2)ge(0)
This is called the "stomate"

(2) Stomate有兩個細胞
Stomate you(3)liang(3)ge(0) xi(4)bao(1)
Stomate have two cells

(3) 這兩個細胞就叫作 - guard cell [writes the vocabulary word in English and in Chinese on the overhead beside the picture]
Zhe(4) liang(3)ge(0) xi(4)bao(1) jiu(4) jiao(4)zuo(4) guard cell
These two cells are called – guard cell

(4) 請問,你們進入這個學校,
Qing(3)wen(4), ni(3)men(0) jin(4)ru(4) zhe(4)ge(0) xue(2)xiao(4)
Let me ask you, when you come into the school

(5) 你們要經過哪裡
Ni(3)men(0) jing(1)guo(4) na(3)li(3)
When you come in through (the school doors)

(6) 誰要檢查你們的 ID?
shei(2) yao(4) jiang(3)cha(2) ni(3)men(0)de(0) ID?
Who inspects your ID?

Student:

(7) . . . . Security . . .

Teacher:

(8) Guard [writes the word "security guard" under the vocabulary word "guard cell"]

(9) 他是管你們, 管大門口的
Ta(1)shi(4) guan(3) ni(3)men(2), guan(3)da(4)men(2)kou(3)de(0)
He is guarding you, guarding the door.

(10) 這個也是管這個門的,管讓它開 (points to the guard cell)
Zhe(4)ge(0)ye(3)shi(4)guan(3) zhe(4)ge(0) men(2)de(0) guan(3) rang(4) ta(1) kai(1)
This also guards the door, letting the door open,

(11) 讓它關的,所以是 guard cell
Rang(4) ta(1) guan(1) de(0), suo(3)yi(3) shi(4) guard cell.
Letting the door close, so it's a "guard cell"

(12) 好,我們再造一句
Hao(3), wo(3)men(0) zai(4) zao(4)yi(2) ju(4)
Okay, let's make another sentence

In Vygotsky's (1962) theory of the Zone of Proximal Development (ZPD) scaffolding (Bruner, 1974) is seen as a ladder that connects the current level of the learner with the next level of learning or acquisition, thus forming deeper connections between new material and existing schemata. In this passage the teacher was introducing new English vocabulary embedded in a Chinese discussion. In line (3) she introduces the term "guard cell." At this point she could have easily translated the term into Chinese and moved on to the next vocabulary word. Instead she suspends the continuation of vocabulary instruction to focus on the word "guard cell." In line (4–6) she asks the students in Chinese a question trying to elicit the terminology that will enable her to draw a metaphor between "security guards" (a word the students were familiar with in the daily context of their school) and "guard cell." In this example the use of metaphoric teaching is evident in the metaphorical connection between the purpose of a "guard" and the function of a "guard cell." This may not have been as easily accomplished if she had used only English; likewise the opportunity for metaphoric teaching may not have occurred if the vocabulary word had been introduced only in Chinese. Thus, in the act of translanguaging she uses code-switching to accomplish her pedagogic purpose.

IMPLICATIONS FOR PRACTICE

Pedagogic code-switching as a methodology for bilingual instruction is problematic if it is seen as a methodology for the linguistic development of bilinguals for the following reasons: 1) additional stress would be placed on teachers to allocate proper divisions of time and quality between languages as seen in concurrent translation methodology; and 2) extensive and often expensive linguistic and pedagogic training would be required and only the inclusion of inter-sentential switches as seen in Jacobson's (1979, 1981, 1983) New Concurrent Approach and Faltis' (1996) Cueing Response System for Code-Switching would be allowed. However, if we view classroom code-switching as "code-scaffolding" within García's (2008) notion of translanguaging, it becomes a pedagogic tool or technique available in bilingual content instruction where the primary focus of instruction is the acquisition of content subject matter. In such environments alternating between codes is nothing more than what a monolingual teacher accomplishes through register-shifting, style-shifting, and bridging techniques such as metaphoric teaching. Asking bilingual teachers not to code-switch in such environments as described in this study is virtually taking away a scaffold that would help facilitate instruction.

Code-scaffolding is not a methodology but a pedagogic technique and can be defined "as a switch between two more linguistic codes (available to the bilingual teacher and emergent bilingual students) in order to facilitate the acquisition and/or comprehension of a concept or metalinguistic element in the continual progression

of the structured or unstructured learning event" (Fennema-Bloom, 2008, p. 133). In effect the switch is enacted to further content or language acquisition and to facilitate learning. As seen in this study, such switches may include 1) student-generated reformulations to check comprehension, 2) teacher-generated reformulations in the act of facilitating comprehension, 3) the established use of class-based or subject-based terminology, and 4) the instructional bridging, contextualization, and re-contextualization of material presented in one language and defined or expanded upon in another. In code-scaffolding, language is used as a strategic tool in the development and comprehension of the instructional content. Switches between languages are made when monolingual scaffolding devices such as in Walqui's (2003) modeling, bridging, contextualization, schema building, text re-representation, and metacognition (c.f. the Appendix of NYCDOE LAP manual (2004, 2008) for a concise description of these six inter-related yet distinct types of scaffolding devices) are not effective, and the students need further support to understand the linguistic or content concept in order to continue the progression of the learning event when language acquisition is not necessarily the direct intent of the class. What it does not include is any switch that either purposely devalues the learner and/or the native language and any switch that limits the progression of content-subject material such as habitual insertions, continuous concurrent translation, and undue subject repetition.

Research on the social implications of classroom code-switching especially in ex-colonial contexts cite code-switching as a hegemonic power play between the dominant and lesser valued languages that might influence students' perceived value of their native/home language and the negative impact that results in the students' attitudes toward language and learning (c.f. Merrit et al., 1992; Arthur, 1996; Camilleri, 1996; Lin, 1996). Thus, teachers need to be mindful of their own language habits and attitudes toward the students and the languages involved in order to avoid switches that devalue the learner or native language. Such switches may include disregarding a correct answer or giving negative feedback to students based on the language of reply in an initiation, response, evaluation (IRE) pattern, switches by the teacher that undermine the language attitudes of the students toward their native language and culture, as well as those that create negative in/out group solidarity between the language users.

CONCLUSION

The three bilingual science-content teachers under observation in this study did their best to adhere to the LAP guidelines by incorporating English into their native language instruction with little to no training in ESL or language inclusion methodologies. In 10 hours/per teacher during one curricular unit of study for a total of 30 hours of audio-visual recorded classroom interaction 3,184 instances of code-switching occurred and were analyzed for their pedagogic value. Four categories emerged within the data that accounted for 2,488 switches with a pedagogic intent: instructional for content acquisition, reformulation, instructional for language

acquisition, and facilitation. A fifth category—habitual—with a total count of 696 incidents was found to hold no pedagogic value and the incidents were more indicative of the teachers' own linguistic idiosyncrasies in language use.

How the teachers utilized code-switching on a conversational level in their classrooms may be best described as translanguaging (García, 2008) because they were trying to negotiate meaning and comprehension in sustained communication with their students. However, as a pedagogic technique or tool, code-switching was used as a scaffolding device similar to that used by monolingual teachers. By viewing code-switching as a scaffold rather than a method, teachers are moved toward thinking about language in relation to their content-subject needs when planning and teaching units and individual lessons. Code-switching in the form of code-scaffolding facilitates learning by linking prior linguistic knowledge with the language and content knowledge targeted for acquisition. Code-scaffolding allows teachers to more actively construct communicative learning events by sustaining and increasing student comprehension and participation through the use of two languages; and thus it can be used where a linguistic switch 1) scaffolds further content acquisition, 2) is made to check and sustain comprehension, 3) scaffolds and or explains difficult elements targeted for language acquisition, and 4) scaffolds the facilitation of a learning event and increases participation amongst the students. Teachers wishing to incorporate code-scaffolding should first understand their own language habits so as to avoid tendencies that may disvalue one or both languages, and also understand the bilingual program/model and educational goals of the school as this technique may not be appropriate for the equal support and development of both languages.

This study was conducted in one transitional bilingual high school's science department among only three teachers. Thus, I encourage more research on the natural discursive language practices of bilingual content teachers across different language dichotomies in order to better understand the role pedagogic code-switching plays in educating bilingual students during content instructional time. Future research needs to be conducted on the use of language in instruction, translanguaging, and pedagogic code-switching in the classroom to understand the processes more fully and to help guide teachers in responsible code-switching practices to optimize the benefits of code-scaffolding as a technique for bilingual content instruction.

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