**INTEGRATING FORM AND CONTENT IN BILINGUAL CLASSROOMS: USING BASIC SCIENCE TEXTS FOR IMPROVING ACADEMIC LANGUAGE PROFICIENCY**

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Introduction

The concept of integrating language and content is a beneficial condition for language learning for its advantages to offer a large amount of language input, engage learners into more interaction and provide output in meaningful communicative contexts (Lo, 2014). The process of interaction brings about receiving modified input whilst learners process negotiation of meaning (Mackey & Oliver, 2002). They also understand target language features through noticing (Gass & Mackey, 2007), and pushing learners for more language output (Swain, 1995) can result in language development.

Content and language integrated learning (henceforth CLIL), a result of the content-based introduction, was launched in the mid-1990s in Europe and its popularity has risen during the past decade. Coyle, Hood and Marsh (2010) define CLIL as a dual-focused educational approach which uses an additional language to endorse the concurrent teaching of language and content. Like CBI (Content Based Instructions), CLIL has also been referred to as an umbrella term (Mehisto, Marsh, & Frigols, 2008) used predominantly in Europe and it covers classes that employs “an integrated approach where both language and content are conceptualized on a continuum without an implied preference for either” (Coyle, 2007, p. 545). Similar to Met’s (1999) language-driven and content-driven ends of continuum, CLIL models can be differentiated as CLIL in language lessons and CLIL in subject lessons (Massler, Stotz, & Queisser, 2014). CLIL in language lessons incorporates other school subjects but highlights language development. CLIL in subject lessons excludes explicit language instruction but learning aims are mainly based on content.

This study has been designed to draw attention of learners to form and meaning simultaneously through integrating form-focused and content-based approaches by means of subject matter discussions using science text as resource. The acquisition of linguistic forms through exposure to subject related instructional intervention enables learners to use the language with greater fluency and accuracy (Spada & Lightbown, 2008). Discussions have the potential to help learners notice language forms and integrate the knowledge into communicative activities (Nystrand, 2006).

Methodology

The focus of the present study was to address the following two research questions:

1. Does the use of classroom discussions of science related texts support language learning?
2. Does the integration of form-focused and content-based approaches within classroom discussions of science related texts provide advantages to improve grammar and vocabulary learning?

The participants in this study were 60 middle school students, who were native Sinhalese, learning science in the medium of English, their second language. Their ages ranged from 12 to 14 years. The students in the study met three hours a week for two months. They were randomly assigned into three different classes (each class with 20 students). A situation was created for the students to engage them in a learning process in which they were exposed to the opportunity to promote grammatical accuracy development and enhance their vocabulary knowledge. In the study, classroom discussions of science related texts served as resource for the students to perceive the features of target structures in contexts and interpret the meanings of unfamiliar words. While expressing their opinions during classroom discussions, the students underwent three different treatment types. The first control group (Group 1) received form-focused instruction. The second control group (Group 2) received content-based instruction while the experimental group (Group 3) received the instruction that included both form-focused and content-based components.

The purpose of the study was to find out which of the treatment types the study used had the potential to improve the students’ ability to master grammar and vocabulary for meaningful communication. The reading materials included *The Magic School Bus Science book series* (1995) by Joanna Cole and Bruce Degen published by the Scholastic Inc; in the USA. The series had 12 Titles that described basic sciences from the human body to climate change. Three titles were chosen from the 12 titles considering their appropriate length, accessible language, popularity amongst young and universal themes. The study employed quantitative method as pre-and post-assessments were feasible methods to assess the extent which an educational intervention influences learning. These tools in this study were used to measure students’ English vocabulary and grammar knowledge.

**Procedure in Group 1**

Explanations, dialogues, key sentences and teacher actions are components of conventional presentation techniques (Johnson, 1996). In this study, Group 1 received treatment that included grammatical explanations and utterances of students in dialogues. Explicit and implicit corrective feedback helped students with the acquisition of grammar. The researcher used recasts and prompts to draw students’ attention to the target forms. All classroom discussions were on the course content and based on the mastery of language forms but the instruction to Group 1 also included instructions that engage learners in communicative practice.

The implementation of both explicit and implicit corrective feedback, as displayed in Table 1, during treatment instruction in Group 1 was conducive to the acquisition of grammatical features. The instructor provided implicit feedback in the following example by responding to the learner’s error in Group 1. In response to the learner’s statement “has became”, the instructor replied, “has become”. The provision of on-the-spot reformulations by an external source created conditions for learners to elicit self-repair and promoted the level of accuracy in language acquisition. An example of explicit feedback was the instructor’s response to the student’s error by saying “use present tense consistently”. It is important to stress that; corrective feedback displayed a significant advantage to repair the errors and produce a modified output.

Student: The bee has became the most important creature in the beehive.

Teacher: Yes, the bee has become the most important insect in the beehive. Can you say why?

Student: Yes, it has become the most important insect there because it is making bee honey in the hive.

Teacher: Use present tense consistently.

Student: Bees dance before they fly to the flowers.

 (Classroom Conversation, Jan. 12)

**Procedure in Group 2**

The instruction in Group 2 did not include references to grammar or linguistic explanations. All classroom discussions focused entirely on content because students’ talk about science came to the front in CBI classes and corrective feedback on form was limited to recasts. Recasts were effective to edit the discourse and repair the conversational breakdowns. Lyster and Ranta (1997) argue that learners in CBI classes may perceive recasts as feedback on meaning. In the following example, discussion is used to construct and negotiate knowledge by the discourse contexts of interaction. The instructor provided recasts to stimulate the student to express the meaning precisely in order to seek constructive ways and to express the meaning precisely.

Teacher: How can you explain climatic change?

Student: It increases global warming.

Teacher: Is it bad?

Student: Yes, ice will melt in Arctic sea and then small islands will sink in that water and disappear.

Teacher: Why do you think we should stop global warming?

Student: because we want everyone to live happily, everywhere in the world, every day in the future.

Teacher: Good point! Let’s discuss this point a bit further.

(Classroom Conversation, Jan. 17)

**Procedure in Group 3**

The instruction in Group 3 included linguistic explanations and references to grammar in meaningful comprehensible input to promote grammatical accuracy development. Both explicit and implicit corrective feedback was used to maximize language development. Discussions are strong potential foundations for grammatically richer intake and meaningful communication establishment. Drawing attention to errors and providing corrective feedback in Group 3 as shown in the following example provided some of the strongest rationales for students to attend to accuracy in communicative activities. Students in Group 3 made appropriate use of form-meaning connections in science text discussions and had a number of distinct advantages to develop accuracy and fluency.

Teacher: What are fossils?

Student: Fossils are the remains of animals that lived millions of years ago.

Teacher: How can we find fossils of sea animals on the top a mountain? They can’t get to that top.

Student: Millions of years ago, those mountains were not mountains. They were part of a flat plain under an ocean.

Teacher: Good Point! Then what happened?

Student: All sorts of sea animals lived there. The earth gradually changed. Ice, rain and flowing water created new mountains gradually, over hundreds of millions of years. The fossils went up to the top of the mountain.

Teacher: Yes, you are correct.

(Classroom Conversation, Feb. 05)

Table 1: Corrective feedback options

|  |  |
| --- | --- |
| Options | Description |
| Implicit Feedback | The teacher responds to students’ ill-formed utterances **without directly indicating** that an error has been made through prompts or recasts. |
| Explicit Feedback | The teacher responds to students’ ill-formed utterances **by directly indicating** that an error has been made through drawing their attention to them or metalinguistic explanation. |

Table 1 defines the correction feedback options that were used in the study. Both types of feedback options were used in all groups in the classroom discussions of science texts. Implicit feedback included responding to the ill-formed utterances of the students indirectly to give them a chance to reformulate their utterances. Explicit feedback included responding to the incorrect utterances by directly indicating that the error should be corrected.

#### **Data Collection**

In this study, a pre-test, a post-test and a delayed post-test were conducted to measure language progress of students. Each test consisted of two parts: grammar and vocabulary, and each part included 25 questions. The students were allowed 45 minutes to complete 50 questions in each test and the scores were given out of 100. Each group had the same tests that included multiple-choice and fill-in-the-blank questions. Students were not penalized for wrong answers; therefore, they did not leave any questions unanswered. The assessment tests were prepared by the researcher. The test outcomes were compared to measure student performance in relation to their vocabulary and grammar development under different treatment conditions.

Table 2: Timeline for pre and post assessments

|  |  |  |
| --- | --- | --- |
| Weeks  | Groups | Data Sources |
| 1 | All groups | Pre-test |
| 8 | All groups | Post-test |
| Two months after the study | All groups | Delayed post-test |

The pre-test was conducted in the first week before the treatment sessions started. In the eighth week, after the treatment sessions were over, the students had the post-test. Finally, delayed post-test was conducted two months after the experiment to determine which treatment measures aided recall. Formative assessment was used to revise or modify the teaching for improvement and pre-assessment was helpful to provide feedback for modification. In summative evaluation, the post-test was assessed to decide whether the teaching needed modification for improvement.

RESULTS AND DISCUSSION

Table 3 below illustrates descriptive statistics (minimum, maximum, mean, and standard deviation) for tests for Group 1. The results show that students in Group 1 increased their scores on all tests. The means showed high improvement for post-test grammar and delayed-test grammar and increased from 64.0 to 74.2, and 77 respectively. With regard to vocabulary tests, the means showed slight improvement and increased from 60.4 to 64.8 in the post-test grammar, and 66.4 in the delayed-test grammar.

Table 3: Descriptive statistics for pre-test, post-test and delayed test for Group 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N  | Minimum  | Maximum  | Mean  | Std. Deviation |
| Pre-test Grammar | 20  | 42.0  | 88.0  | 64.0  | 13.50  |
| Post-test Grammar | 20  | 52.0  | 92.0  | 74.2  | 11.74  |
| Delayed-test Grammar | 20  | 52.0  | 94.0  | 77.0  | 12.50 |
| Pre-test Vocabulary | 20  | 40.0  | 80.0  | 60.4  | 11.67  |
| Post-test Vocabulary | 20  | 46.0  | 84.0  | 64.8  | 10.92  |
| Delayed-test Vocabulary | 20  | 48.0  | 86.0  | 66.4  | 10.92 |

Table 4 below illustrates descriptive statistics (minimum, maximum, mean, and standard deviation) for tests for Group 2. The results indicate that students in Group 2 increased their scores on all tests. The means showed high improvement for post-test vocabulary and delayed-test vocabulary and increased from 58.9 to 69.9, and 72.9 respectively. With regard to grammar tests, the means showed slight improvement and increased from 66.1 to 69.3 in the post-test grammar, and 70.8 in the delayed test grammar.

Table 4: Descriptive statistics for pre-test, post-test and delayed test for Group 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  N  | Minimum  | Maximum  |  Mean  | Std. Deviation |
| Pre-test Grammar  | 20  | 44.0  | 86.0  | 66.1  | 10.84  |
| Post-test Grammar  | 20  | 52.0  | 88.0  | 69.3  | 9.86  |
| Delayed-test Grammar  | 20  | 52.0  | 90.0  | 70.8  | 9.78 |
| Pre-test Vocabulary  | 20  | 40.0  | 76.0  | 58.9  | 10.73  |
| Post-test Vocabulary  | 20  | 48.0  | 90.0  | 69.9  | 12.30  |
| Delayed-test Vocabulary  | 20  | 52.0  | 92.0  | 72.9  | 13.001 |

Table 5 below illustrates descriptive statistics (minimum, maximum, mean, and standard deviation) for tests for Group 3. The results indicate that students in Group 3 increased their scores on all tests. The means showed high improvement for all tests. The means for grammar tests increased from 63.8 to 79.7 in the post-test grammar, and 82.6 in the delayed-test grammar. With regard to vocabulary tests, the means showed improvement and increased from 61.8 to 75.4 in the post-test vocabulary, and 78.8 in the delayed-test vocabulary.

Table 5: Descriptive statistics for pre-test, post-test and delayed test for Group 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  N  | Minimum  | Maximum  |  Mean  | Std. Deviation |
| Pre-test Grammar  | 20  | 40.0  | 78.0  | 63.8  | 10.38  |
| Post-test Grammar  | 20  | 50.0  | 94.0  | 79.7  | 12.02  |
| Delayed-test Grammar  | 20  | 48.0  | 96.0  | 82.6  | 14.25 |
| Pre-test Vocabulary  | 20  | 40.0  | 78.0  | 61.8  | 10.25  |
| Post-test Vocabulary  | 20  | 46.0  | 92.0  | 75.4  | 11.80  |
| Delayed-test Vocabulary  | 20  | 46.0  | 94.0  | 78.8  | 13.16 |

Figure 1 below displays comparison of means for grammar tests which reveal that students in Group 3 showed better improvement than the other two groups and demonstrated significant improvement in scores from pre-test to post-test and maintained this improvement in delayed post-test. Similarly, Group 1 outperformed Group 2 and made significant gains over time. Group 2 could not make significant gains in grammar tests.

 Figure 1: Means of pre-test, post-test and delayed-test grammar for all 3 groups

Comparison of means for vocabulary tests which appear in Figure 2 reveals that students in Group 3 showed better improvement than the other two groups and made significant gains between pre-test and post-test. Likewise, Group 2 outperformed Group 1 and made significant gains over time. Group 1 could not make significant gains in vocabulary tests.

Figure 2: Means of pre-test, post-test and delayed-test vocabulary for all groups

Table 6: Paired t test values for grammar tests group comparison

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  Group | 1 |  | Group | 2 |  |  Group | 3 |  |
| Pairs | Tests | t | df | P-Value | t | df | P-Value | t | df | P-Value |
| Pair 1 | Grammar Pre-test 1 andGrammar Post-test 1  | -14.769  | 19 | .000\*  | -8.718  | 19 | .000\*  | -24.430  | 19 | .000\*  |
| Pair 2 | Grammar Post-test 1and Grammar Delayed Post-test 1  | -4.222  | 19 | .000\*  | -2.517  | 19 | .021\*  | -3.500  | 19 | .002\* |

\*Significant at P < .05

A paired samples t-test showed a statistically significant difference between pre-test and post-test grammar results in Group 1 (t = -14.8, p<.001); Group 2 (t = -8.8, p<.001); and Group 3 (t = -24.430, p<.001). Similarly, the test showed a statistically significant difference between post-test and delayed post-test grammar results in Group 1(t = -4.222, p<.001); Group 2 (t = -2.517, p<.05); and Group 3 (t = -3.500, p<.005).

Table 7: Paired t test values for vocabulary tests group comparison

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  Group | 1 |  | Group | 2 |  |  Group | 3 |  |
| Pairs | Tests | t | df | P-Value | t | df | P-Value | t | df | P-Value |
| Pair 1 | Vocabulary Pre-test 1and Vocabulary Post-test 1 | -12.815  | 19 | .000\*  | -15.983  | 19 | .000\*  | -20.168  | 19 | .000\*  |
| Pair 2 | Vocabulary Post-test 1and Vocabulary Delayed Post-test 1  | -3.238  | 19 | .000\*  | -5.090  | 19 | .000\*  | -6.240  | 19 | .000\*  |

\*Significant at P<.05

A paired samples t-test values revealed a statistically significant difference between pre-test and post-test vocabulary results in Group 1(t = -12.815, p<.001); Group 2 (t = -15.983, p<.001); and Group 3 (t = -20.168, p<.001). Similarly, the test revealed a statistically significant difference between post-test and delayed post-test vocabulary results in Group 1 (t = -3.238, p<.005); Group 2 (t = -5.090, p<.001); and Group 3 (t = -6.240, p<.001).

Pre-and post-assessments were conducted to measure students’ progress under different treatments. The results of the tests showed that the experimental group (Group 3) which was exposed to the mixed approach made noticeable gains compared to the other two groups. Comparing all treatment groups in all tests, the students in Group 3 made the best progress in terms of grammatical and lexical forms.

The debate whether grammar instruction in the communicative classroom should be provided or not have posed two extremes: while some advocate minimal attention to grammar, some advocate ample attention and integrate the knowledge into communicative activities (Sheen, 2002). In the realm of the language classroom, some linguistic features are acquired without guided attention; conversely, it is evident that some linguistic features do not develop in the absence of intentional effort (Spada & Lightbown, 2008). The study shows that FFI treatment in Group 2 outperformed CBI treatment in Group 3 on the grammar component. It has been suggested by linguists and practitioners alike that some form of grammatical instruction should be included in language programs because a lack of grammatical accuracy is an obstacle for not developing native-like abilities in written or oral language proficiency (Millard, 2000). Production of correct and advanced language and appropriate use of language units help language learners keep interactions going and, promotes their access to language input (Krashen, 1982). There is a growing consensus that some language features do not appear in learners’ use of language without FFI (Spada & Lighbown, 2008). When criteria by Long (1991) and Norris and Ortega (2000) are followed, it is feasible that they emphasize on both the need for communication and form-oriented instruction.

Another issue to point out is that CBI treatment is more effective than FFI treatment on the vocabulary component. Further, as Brown (1994) stresses, language is spoken at the discourse level rather than sentence level because meanings are not acquired from isolated individual sentences but from “referents in both previous sentences and following sentences” (p. 235). However, it is rare for learners to reach high levels of linguistic competence from engaging in entirely meaning-focused instruction. When grammar scores of CBI treatment are examined, it is noticed that they seemed to lack language accuracy. Swain (1993) discovered that without exposure to language forms, simply learning in context does not lead to real gains in achieving the desired outcomes in proficiency level. In a meaning-based classroom “learners are usually not specifically taught the strategies, maxims and organizational principles that govern communicative language use but are expected to work these out for themselves through extensive task engagement” (Celce-Murcia, Dornyei, & Thurrell, 1997, p. 141) because meaning-based instruction aims to enhance ability of learners to communicate in real-life settings. This engagement provides learners with an ample amount of target language samples that may develop their sociolinguistic, discourse, strategic and linguistic competence (Barrot, 2014).

Treatment 3 was shown to be effective in that the learners performed better on both grammar and vocabulary components. Pre-assessment and post-assessment results showed that learner made measurable gains in language learning outcomes. The findings of the study support the claim that English texts related to basic sciences are effective means of developing grammar and vocabulary knowledge in bilingual science classes amongst middle schoolers. The findings demonstrated that the value of science related English text discussions is its merit to integrate attention to language form and content knowledge to render learners’ form and meaning connection. Also, it was seen that, the students were able to retain newly acquired knowledge for a long time when form and content was integrated in the language classroom.

conclusions/RECOMMENDATIONS

FFI draws learners’ attention to target features to reach high levels of linguistic competence. The acquisition of linguistic forms provides clear benefits for language learners to perceive the characteristics of target structures in context and use the language with greater accuracy. Corrective feedback, a type of FFI, has been considered conducive to language learning as learners have the opportunity to correct their errors. CBI is the simultaneous study of language and content. Content-based classrooms provide language learners the opportunity to negotiate form and meaning and promote their knowledge. Language learners construct knowledge and negotiate through the discourse contexts of interaction. CBI situates the comprehensible input at the core of language acquisition. The incentive of CBI to impact verbal interaction of language learners motivates them for successful outcomes. The present study has highlighted the foundation that the integration of FFI and CBI within bilingual classroom discussions of basic science texts is a powerful approach to help learners make form-meaning connections and achieve measurable gains in language learning outcomes.

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