

Developing a Formative Test for a CBI Class

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Abstract

The purpose of the project is to develop a formative test that adequately measures vocabulary and content knowledge that students have gained in the CBI class in the program of intensive English at Northern Arizona University. In addition, it is aimed at investigation of the relationship between vocabulary and content knowledge tests. The results showed that from the quantitative point of view the test designed had a low validity due to its insignificant statistical data. However, the qualitative analysis provided much evidence for the content validity and demonstrated that the test represented the constructs that it intended to measure. In terms of relationship between vocabulary and content knowledge tests, an insignificant negative correlation was identified. The results of the test could be used by the CBI teachers to improve the assessment tool they use to evaluate CBI students' progress and modify their instruction in order to fill in possible gaps in students' knowledge.

Developing a Formative Test for a CBI Class

Background

Over the past several years, content-based instruction (CBI) has been promoting by many researchers because of its dual commitment to both content and language learning objective (Snow, 1998; Stoller, 2004). Especially in many English for Academic Purposes (EAP) programs, CBI is adopted in curriculum to foster second language learners' comprehensive language skill development in order to enhance their success in university. According to Krashen (1982), in CBI, students can learn content knowledge of subject matter and develop their language skills simultaneously. In order to understand the content knowledge of the subject/theme, students' reading comprehension skill must be well developed. In turn, reading comprehension is greatly influenced by students' vocabulary knowledge. Antonnaci and O'Callaghan (2011) assert that the relationship between vocabulary and reading comprehension is strong: if learners perform well in vocabulary tests they get high score on the reading comprehension tests as well. This relationship leads researchers to the conclusion that vocabulary knowledge is also critical for content knowledge learning.

Thus, the purpose of this project was to develop a formative CBI test that adequately measures vocabulary and content knowledge in order to examine the relationship between students' learning of vocabulary and knowledge of content area in CBI classes in the program of intensive English (PIE) at NAU. The PIE CBI class meets three time per week and each class lasts 2 hours. The PIE content-based course contains 4 themed units. To test students' knowledge learned in each unit, teachers grade classwork (10% of the grade), quizzes (15%), homework (20%), and projects (55%). Each themed unit ends up with a project where students need to implement the language and content knowledge they have gained during the CBI class. The

current assessment project is one of the 4 in-class quizzes and is important for the teachers because its results can possibly provide information about more effective ways to develop assessment tool which would adequately measure the targeted constructs.

The test was designed to measure two constructs: vocabulary and content knowledge gained during the CBI class in the themed unit that focused on the topic of endangered species. Under the vocabulary construct the test measured the ability to recognize meanings of the words and identify vocabulary words that fit the context. Content knowledge construct was characterized by several subconstructs in the test developed for the current project. They incorporated the ability to find correct and wrong statements, identify facts and content relationships, such as sequence of a process, causes and effects.

The test was developed as a formative assessment to evaluate how much students had learned from the theme covered. The scores gained by the students on the test could be used to judge how to modify instruction and test development to make them more effective and to increase students' learning outcome. The results of the test influenced the overall performance of the students and constitute about 4% (out of 15% for all the 4 quizzes in the course) of the final grade for the class.

The investigators hypothesized that the parts of the test would be positively correlated as the constructs were slightly overlapping. The assumption was that if students knew the meaning of the words from the vocabulary part, they probably would be able to fulfill the tasks better in the content section. On the other hand, content-based test might also provide some contextual clues to give correct answers in the vocabulary part of the test. In other words, there could be a linear relationship between the constructs.

Research Questions

The study addressed the following research questions:

1. How adequately does the vocabulary test measure vocabulary knowledge gained from the CBI class?
2. How adequately does the content knowledge test measure knowledge gained from the CBI class?
3. What is the relationship between vocabulary and content knowledge tests?

Methods

Participants

Forty-one PIE students from three sections of Level 4 CBI class took the test. The results of 34 students who signed the consent form were analyzed for the purpose of the study.

Materials

The test was developed based on the three reading passages and lectures that were covered in CBI class. Two subtests, namely vocabulary test and content knowledge test, were designed in order to measure students' learning progress reflecting the theme of endanger species. For the vocabulary subtest, 10 items in total were designed as two different test forms: 5 for *Matching*, and 5 for *Filling in the blanks*. As for the content knowledge subtest, total 10 items were developed as four different test forms: 3 for *True/False*, 2 for *Multiple-Choice*, 3 for *Filling in the graphic organizer*, and 2 for *Restricted-response essay questions*. In terms of score, each item was worth one point. Thus, total score for the vocabulary test was 10, and the same for content knowledge test. Both subtests were graded by each CBI teacher who administered the test for their own section.

Administration

Eleven students from 4A section took the vocabulary test followed by the content knowledge test whereas 23 students from 4B and 4C sections fulfilled the content knowledge test followed by the vocabulary test. The purpose of administering the test in different order was to investigate whether the sequence of test taking would influence students' performance.

Results

By means of quantitative and qualitative analysis of the test, the project intended to examine, first, how adequately the vocabulary subtest measured students' lexical knowledge and, second, whether content knowledge section adequately tested the amount of content area knowledge gained in CBI class. Besides, the analysis focused on the relationship between vocabulary and content knowledge tests. In terms of the first and second question, quantitative analysis did not show significant results as the score range of the subtests was narrow (see Table 1) due to the fact that majority of test takers got full score resulted into rather low reliability. Overall, the test was quite easy, especially the vocabulary subtest. However, according to the qualitative analysis, the test may consider valid as the content of the subtests is centered around the vocabulary list and articles covered in the classes. Additionally, the subconstructs of the test correspond to the constructs described in the course objectives of the CBI class. To investigate research question 3, the correlation coefficient was calculated. In the quantitative framework, the two subtest did not prove to have positive correlation as it was hypothesized in the project. However, a more close analysis of the quality of the test items might show that even if the content knowledge section primarily measures the content-matter information, it is assumed that it also measures the knowledge of vocabulary but in an indirect way.

Although there are some shortcomings, the test developed for the present project seemed to have fulfilled its goals. In the framework of the qualitative analysis, it measured what it was supposed to measure which could be an indicator of content validity. The results showed that the students gained much knowledge from the endangered animals unit as everybody performed very well on the test and no failed group was identified.

Table 1

Descriptive Statistics of the CBI Test

<u>Statistics</u>	<u>Content</u>	<u>Vocabulary</u>
k	10,00	10,00
N	34,00	34,00
Mean	9,18	9,88
Mode	10,00	10,00
Median	10,00	10,00
Min	5,00	8,00
Max	10,00	10,00
Midpoint	7,50	9,00
Range	5,00	2,00
Variance (N>30)	1,73	0,16
Variance (N<30)	1,79	0,17
SD (N>30)	1,32	0,40
SD (N<30)	1,34	0,41
Skewness	-1,64	-3,75
Kurtosis	2,07	14,54

Relevance to PIE and Second Language Learning

Based on the findings of the current project, some possible improvements could be suggested in term of CBI test developing. Depending on the teachers' purposes and CBI class settings, it might be beneficial for teachers and students to make the test a bit more complicated, so that some gaps in the students' knowledge could be identified and filled in the future. Thus, it might be a good idea to diversify the repertoire of items used in the test and make it more

productive that would develop students' high level of thinking. For example, short essays items could be included into the test the answer to which may show the ability of students to integrate their vocabulary and content knowledge and demonstrate whether they use the vocabulary words appropriately to the context of specific content area. Moreover, the test would be slightly more difficult for the students if some items focusing on the synthesizing key ideas and facts from several articles covered in the class were included.

References

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