The relationship between students’ interest in bilingual science learning and students’ English competence

Regina Lichteria Panjaitan and Riana Irawati

Pendidikan Guru Sekolah Dasar, Kampus Sumedang, Universitas Pendidikan Indonesia, Jalan Mayor Abdurrahman 211, Sumedang 45322, Indonesia
E-regina@upi.edu

Abstract. The correlation of students’ interest in bilingual science learning and their English competence was investigated. Forty-six students of elementary-school teacher candidate program participated in this study. The students received five topics of science (Heat, Changes in Matters, Plant Life and Environment, Simple Machine, Animal Life and Environment) with English usage embedded. The students’ interest in science learning involving English was examined. Meanwhile, the students’ mastery of general English was measured. The result shows that the students’ interest in bilingual science learning and their English mastery is not significantly correlated. The finding suggests that the students might still enjoy and get benefit from bilingual science learning despite their English abilities. This leads to the opportunity to have more bilingual science classes to enhance not only students’ science mastery but also their English competence.

1. Introduction
It is indisputable that English mastery is absolutely essential these days. English is a passport to bigger chances on profession and preferable education [1]. On top of that, Indonesia as a member of The Association of Southeast Asian Nations (ASEAN) has entered ASEAN Economic Community (AEC) in 2015. The establishment of AEC leads to enhancement of flow of skilled labors among ASEAN nations [2]. This brings on the higher need of English competence to communicate. Besides, adequate English proficiency is required to reinforce academic performance. For instance, there is a research that indicates that the better students’ proficiency in English, the better their academic performances in science [3].

On the other hand, despite the high need of good English proficiency, English is often considered as a difficult subject to Indonesian students, especially academic English [4]. Hence, there is an urge to have extra endeavors to enhance English competence. One of the efforts is to immerse Indonesian students in English-speaking surroundings in a non-English-lesson class without sacrificing the core of subject that they need to master which could be performed with bilingual learning.

Bilingual learning itself has not only some advantages but also limitations. Some studies agree that bilingual learning ameliorates students’ English proficiency [6] and raises enthusiasm to the teaching [6]. In contrast, bilingual education may set limited English proficient students apart from other students [7].

Notwithstanding the debate about the effectiveness of bilingual learning, the importance of enhancing students’ English competence is still a priority. As a result, implementing bilingual learning for several non-English-lesson classes (which means classes in non-English department) is one of the policies of the rector of Universitas Pendidikan Indonesia since 2015. At elementary-school teacher
education study program Universitas Pendidikan Indonesia Kampus Sumedang, science-enrichment subject is delivered in bilingual way, using Bahasa Indonesia as students’ first language and English. Unfortunately, in the beginning of the semester, when the students knew that some parts of the subject would be delivered in English (as the consequence of bilingual learning), some students seemed reluctant and doubtful that whether they could master the science material while they thought that their English competence is still not sufficient. This some students’ fearfulness of using English in science class resulted in a question about whether the students’ interest in bilingual science learning depended on students’ previous English competence in general.

2. Methodology
This study was designed to find whether students’ interest in bilingual science learning significantly correlates with students’ previous English proficiency in general. This correlational research was conducted at Universitas Pendidikan Indonesia, Sumedang Campus with forty-six elementary school teacher candidate students as samples. Five science-enrichment topics (heat, changes in matters, plant life and environment, simple machine, animal life and environment) in five meetings were delivered in class bilingually. English was used in giving instruction, while the rest of the lesson part was conveyed in Bahasa Indonesia. Next, English competence was measured with ten questions; four of them were taken from senior high school national exam for year 2014 and the rest were part of Indonesian public university admission test for year 2015. Six Likert-type scale statements were used to gather data about students’ interest in bilingual science teaching. The correlation between students’ interest in bilingual science learning and students’ English competence was computed with Pearson correlation (Pearson’s $r$), and the formula for Pearson’s $r$ [8] is

$$ r = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\sqrt{\Sigma(x-\bar{x})^2}\sqrt{\Sigma(y-\bar{y})^2}} \quad (1) $$

where $X$ here is students’ English competence and $Y$ is students’ interest in bilingual science learning.

After calculating $r$ with equation (1), the significance of the correlation coefficient could be interpreted. For checking the significance, it is needed to calculate observed-$t$ with equation (2) as follows [8].

$$ t_{(\text{observed})} = r \sqrt{\frac{N-2}{1-r^2}} \quad (2) $$

where $N$ is the number of data, and it means that $N-2$ is degrees of freedom. For this study with $N=46$, the critical value for Pearson’s correlation is 2.013 (level of significance 0.05), and the result of correlation can be considered significant if observed-$t$ is greater than the critical value for Pearson’s correlation.

3. Results and Discussion
The English competence and the interest towards bilingual science learning of forty-six students of elementary school teacher candidate program were examined. Then, the Pearson correlation of those two variables was calculated. From the data, the attained Pearson correlation $r$ is 0.244, meanwhile the Pearson’s correlation critical value for $N = 46$ is 2.013 (level of significance 0.05). The observed-$t$ for this case was 1.668. It can be seen that the observed-$t < 2.013$. Because the observed-$t$ is less than the Pearson’s correlation critical value, it can be inferred that there is no significant correlation between students’ interest in bilingual science learning and their English competence. The data displayed on the graph in figure 1.
Figure 1 shows a scatterplot of students’ English competence and students’ interest in bilingual science teaching relationship. The number of students involved in this study was forty-six ($N = 46$), so evidently a single black dot could represent one or more-than-one pair of data. It has to be noticed that for this scatterplot graph, a single dot could be overlapped by other dot/dots, so one dot in figure 1 could represent more than one students. It appears that although the correlation is not significant, actually there was a positive relationship between those two variables, it is very weak, though.

Although statistically a significant correlation between the students’ interest in bilingual science learning and their English competence was not found, the frequency distribution data shows that the highest interest-score on bilingual learning was noted in the student with the highest English score. On the other hand, students who answered all of the English questions incorrectly (there were 2 students in this case) still had quite good interest-score on bilingual learning (20 and 24, out of 30).

![Figure 1](image)

**Figure 1.** The plot data of students’ interest in bilingual science teaching vs. students’ English competence

From figure 1 it can be seen that there were still students who had very low English competence (they got no score when tested), and the highest score of English competence attained was 6, out of 10. As explained in Section 2, the problems-set tested was a standard examination for senior-high-school graduate. Most of the students (14 out of 46) has only scored 3 (out of 10) in English competence. Therefore, it means that the students participated in this study may be classified as limited English proficient (LEP) students. Consequently, from this study it can be inferred that LEP students can be still interested in bilingual science learning and their enthusiasm towards this bilingual learning was not related to their previous English proficiency.

4. **Conclusion and suggestion**

From the result, it can be seen that the correlation between the students’ interest in bilingual science learning and students’ English competence was insignificant. This finding leads to the implication that it is not really needed for the science teachers using bilingual learning to dwell on whether their students are not interested in their subject due to students’ limited proficiency. Considering that LEP students (even students with very low English competence) still have interests in learning science bilingually, the bilingual science teacher might facilitate this students by giving some basic English-enrichment related to science (excluding from the formal science class if it is possible) so the students would not face too many difficulties in understanding bilingual science learning in a formal class. This study result also encourages other-subject teachers to perform bilingual teaching practice that might be suitable, despite the students’ English competence. Science teachers as well as other-subject teachers are fortified to use bilingual teaching to acquire maximum benefits of it.
Acknowledgments
The authors thank all elementary school teacher candidate students of Universitas Pendidikan Indonesia at Sumedang campus who took part in this study.

References
[1] Ahmad S R 2016 Importance of English communication skills. Int. J. of Appl. Research 2 (3) 478-80
[2] The Association of Southeast Asian Nations (ASEAN) 2015 A Blueprint of Growth ASEAN Economic Community 2015: Progress and Key Achievements (Jakarta: ASEAN Secretariat)
[3] Aina J K, Ogundele, A G and Olanipekun S S 2013 Students’ proficiency in English language relationship with academic performance in science and technical education American J. of Educational Research 1 (9) 355-8
[4] Novera I A 2004 Indonesian postgraduate students studying in Australia: an examination of their academic, social and cultural experiences Int. Education J. 5 (4) 475-87
[5] Suwanara K 2014 Bilingual Learning and its Effects on Students’ Communicative Competence Proceedings of The International Conference on Language and Communication 2013: Innovative Inquiries and Emerging Paradigms in Language, Media and Communication ed H Y-H Lee (The National Institute of Development Administration, Bangkok, Thailand) pp 179-89
[6] Li Y and Wang L 2010 A survey on bilingual teaching in higher education institute in the Northeast of China J. of Language Teaching and Research 1 (4) 353-7
[7] Chin A 2015 Impact of Bilingual Education on Student Achievement. IZA World of Labor: 131. Available from: doi: 10.15185/izawol.131 [Retrieved 15th August 2017].
[8] Healey J F 2012 Statistics: A Tool for Social Research (Belmont: Wadsworth Cengage Learning)