

Effective Shadowing Training in English Classes of College of Technology (Kosen) in Japan and Resolution of Intracerebral Language Processing Mechanism while Shadowing: With Wired Headphone System and NIRS

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Abstract

This study explores the following two studies about “shadowing” as a method of learning English. The first is the practical study to conduct the most effective shadowing training in English classes in normal classrooms of College of Technology (Kosen) in Japan. First, a low-cost wireless listening system was built. The same sounds can be reproduced from both the front and the back of the classroom at the same time by connecting the CD player with the line-out function to the portable wireless speaker. Furthermore, a low-cost simple LL system was built with wired headphones. The same sound can be heard from 12 wired headphones at the same time with the system. 40-minute shadowing training class was practiced four times targeted for 11 advanced engineering course 1st year students with the wired listening system on July 26th-30th, 2010. The students that took shadowing training significantly improved their listening comprehension ability compared with the students that took TOEIC listening preparation classes (40 minute, four times) on July 27th-31st, 2009. The second is to resolve intracerebral language processing mechanism by measuring changes of bloodstream in brain with NIRS: near-infrared spectroscopy while Japanese native speakers that study English as a foreign language are practicing shadowing, repeating, and oral reading in order to suggest each English learner the most effective method of learning English scientifically. This study is in the process of research and the study plan and the progress are to be reported in this paper.

Keywords: Shadowing, Working Memory, Wired Headphone System, NIRS

1. Introduction –Theory and Practice of Shadowing–

Recently, “shadowing” is widely noticed in English Teaching in Japan. Shadowing is a method for training both listening and speaking skills by repeating sounds as accurately and quickly as possible, and it was originally a basic training for simultaneous interpreters.

According to Kadota (2007), shadowing is effective for (1) “automatization of speech perception”, and (2) “internalization of new items”. (1) “Automatization of speech perception” refers to improving listening skills by training sound perception and automatizing it by repeating the English sound that English native speaker pronounce the text of the first appearance as quickly as possible. (2) “Internalization of new items” refers to fix memory by internalizing new items such as new words and grammar by making efficient of “subvocal rehearsal” in phonological loop in working memory model by Baddeley (1986). The voice that repeat the partner’s utterance in mind is called “inner voice” in cognitive psychology. The action is called “subvocal rehearsal.” The action that voice “subvocal rehearsal” deliberately is “shadowing”.

Tamai (1992) demonstrated that shadowing was effective for improving listening comprehension skills of Japanese high school students. Mochizuki (2006) demonstrated that shadowing was effective for improving

listening comprehension skills of Japanese junior high school students. Shadowing has become more and more popular in general English teaching.

2. Effective Shadowing Training in English Classes of College of Technology (Kosen)

The practical research was planned to conduct the most effective shadowing training in normal classroom in English classes of College of Technology (Kosen) in Japan.

The wireless speaker was introduced in order to resolve the problem that students cannot concentrate on shadowing training by interrupting other students' voice in normal classroom. The low-cost system was built that the same sounds can be reproduced from both the front and the back of the classroom at the same time by connecting the CD player with the line-out function (Victor CD Portable System, RD-15, list price: 47,250 yen) to the portable wireless speaker (audio-technica, AT-SP770TV, list price 25,200 yen).

The system gives a basic environment for shadowing training in normal classroom.



Figure 1. CD player with line-out function



Figure 2. Portable wireless speaker

The most effective shadowing training should be practiced in a LL room or a CALL room to avoid noise from surroundings. If neither a LL room nor a CALL room at school, what can we do?

In the beginning, building wireless listening system with wireless headphones in normal classroom for shadowing training was attempted. However, wireless listening system was too expensive. For example, it cost more than 500,000 yen per one classroom (40 students).

Besides, it is not realistic to carry 40 wireless headphones every English class.

Then the first plan was changed to 'wired' listening system. A simple 'wired' LL system was built. The same sound can be heard from 12 wired headphones at the same time with the system in the old audio-visual room where nobody uses. By connecting a splitter to a CD player, one sound cable can be transformed into three sound cables. Besides, by connecting each sound cable to a headphone amplifier, 4 wired headphones can be connected to the amplifier.

Eventually, 12 wired headphones can be connected to a CD player. Similarly, the maximum 60 wired headphones can be connected to a CD player with 5 splitters. It costs about 50,000 yen for 12 wired headphones system, about 200,000 yen for 50 wired headphones system. The 'wired' headphone system is more economical compared with the wireless headphone system.



Figure 3. Headphone amplifier

3. Shadowing Training in the English Camp 2009 and 2010 at Yuge National College of Maritime Technology, Advanced Engineering Course (YNCMT, ACE)

3.1 Outline of the English Camp 2009 and 2010 at YNCMT, ACE

Yuge National College of Maritime Technology, Advanced Engineering Course, English Camp 2010 was held for 11 first-year students of the advanced engineering course (comparable to university 3rd year) from July 26th, 2010 to July 30th, 2010. In the English camp, 40 minute shadowing training was practiced four times for 11 students with 11 wired headphones.

Past public high school entrance examination English listening from “Deep Listening Level 1” by STEP (Eiken) were used as shadowing materials because Kadota (2009) recommends “bottom-up shadowing” to promote automatization of sound perception. That means shadowing new English sentences for the first time, not already studied. Students concentrated on shadowing training, understanding the contents by using comparatively easy materials without Japanese explanation.

21 hours of intensive Advanced Engineering Course English Camp was held during the summer in small classes in 2009 and 2010. The program was as follows: a small English conversation class conducted by native English speaking teachers (8 hours), an English speaking BBQ party (2 hours), an English listening and reading class by a Japanese English teacher from the department of general education (4 hours), an English presentation preparation class (4 hours), an English presentation class (1 hour). And pre and post English placement test (Eigo nouryoku hantei test) (2 hours).



Figure 4. Wired headphone system



Figure 5. Shadowing training class

Reading and listening classes for TOEIC preparation were practiced, but shadowing class was not practiced in 2009.

Rapid reading classes (20 minute class 4 times) by using STEP (Eiken) pre-2nd grade and 2nd grade past test, and shadowing training classes (40 minute class 4 times) by using the past English listening test from public high school entrance examination were practiced in 2010.

The English placement test C (Eigo nouryoku hantei test C) promoted by STEP (Eiken) was executed as a pre-test and post-test. The result of the test is shown by score of absolute evaluation, based on IRT (Item Response Theory). The scores can be compared with the same criterion even if the different test is taken at a different time. The score of test C is shown from minimum 0 point to maximum 570 points. 370 points is equivalent to the passing grade of STEP (Eiken) 3rd grade written test. 490 points is equivalent to the passing grade of STEP (Eiken) pre 2nd grade written test. In addition, the correct answer rate is shown by percentage for vocabulary and grammar part, sentence structure part, reading part, and listening part.

Pre-test and post-test in 2009 and 2010 were analyzed. The result is as follows.

3.2 Improvement of Average Total Scores of Pre and Post Test

As for the total score, the average score of the pre-test was 346.8 points, the average score of the post-test was 386.8 points, and the average score of the post-test improved by 40.0 points on average in 2009. As a result of analyzing the pre-test scores and the post-test scores using paired t-test, significant differences were observed ($p < .01$).

The average score of the pre-test was 357.9 points, the average score of the post-test was 415.3 points and the average score of the post-test improved by 57.4 points on average in 2010. As a result of analyzing the pre-test scores and the post-test scores using paired t-test, significant differences were observed ($p < .01$). The difference in improvement of the total score in 2009 and 2010 was 17.4 points. Analyzing the improvement of the total scores in 2009 and the improvement of the total scores in 2010 using student's t-test revealed no significant difference (n.s.).

As a result, it was not proven that 2010 with shadowing training improved the average total scores compared with non-shadowing training. However, the average total scores of the post-test improved significantly compared with the pre-test in both 2009 and 2010. This proved that the "English Camp" was effective for advancing students' general English skills.

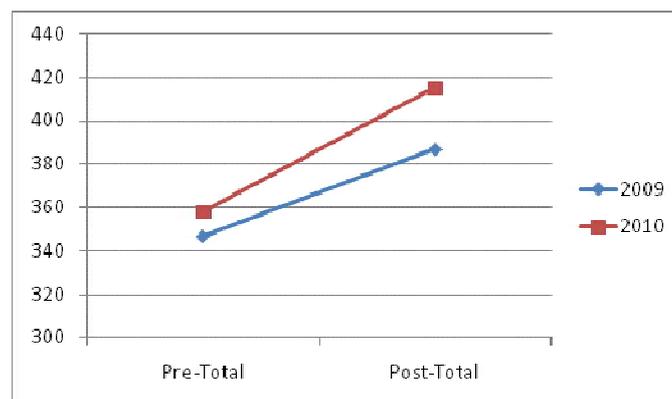


Figure 6. Improvement of average total scores of pre and post test

3.3 Improvement of Reading Correct Answer Rate of Pre and Post Test

As for the correct answer rate for reading, the correct answer rate for reading of the pre-test was 62.79%, that of the post-test was 76.68%, which improved by 13.89 points in 2009. The correct answer rate for reading of the pre-test was 71.53%, that of the post-test was 89.71%, which improved by 18.18 points in 2010.

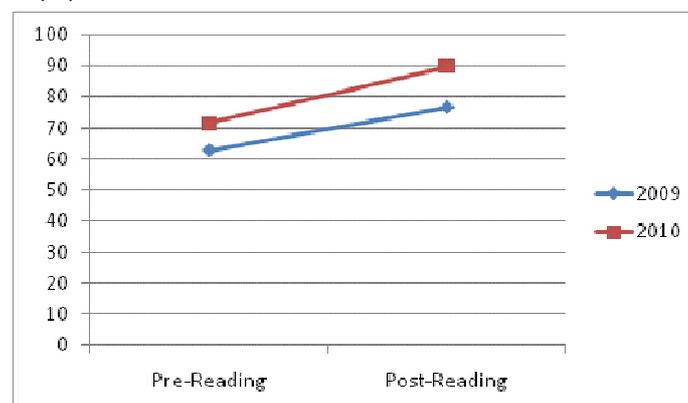


Figure 7. Improvement of reading correct answer rate of pre and post test

The difference in improvement of the correct answer rate for reading in 2009 and 2010 was 4.29 points. Analyzing the improvement of the correct answer rate for reading in 2009 and the improvement of the correct answer rate for reading in 2010 using student's t-test revealed no significant difference (n.s.).

3.4 Improvement of Listening Correct Answer Rate of Pre and Post Test

As for the correct answer rate for listening, the correct answer rate for listening of the pre-test was 66.38%, that of the post-test was 73.06%, which improved by 6.68 points in 2009. Listening correct answer rate of the pre-test was 65.77%, that of the post-test was 81.81%, which improved by 16.04 points in 2010.

The difference in improvement of the correct answer rate for listening in 2009 and 2010 was 9.36 points. Analyzing the improvement of the correct answer rate for listening in 2009 and the improvement of the correct answer rate for listening in 2010 using student's t-test revealed significant difference ($p < .05$).

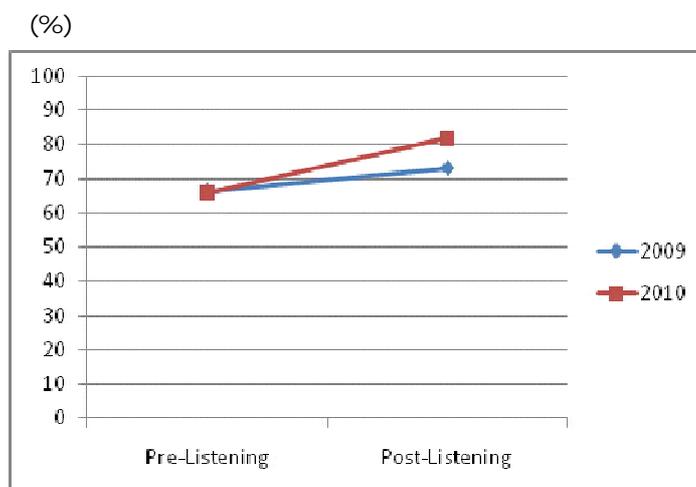


Figure 8. Improvement of listening correct answer rate of pre and post test

3.5 Conclusion and Future Study

From the above, it was demonstrated that shadowing training improved students' listening comprehension abilities significantly. However, it was not demonstrated that shadowing training improved students' reading comprehension abilities significantly.

In future study, a three month shadowing training will be practiced. It will be tested for the effectiveness of shadowing for improving not only listening comprehension skills but also reading comprehension skills, compared with non-shadowing group.

In addition, the class will be divided into two groups, one group that conducts shadowing training with English text already studied and the other group that conducts shadowing training with English sentence for the first time. The learning effect before shadowing training and after the three month shadowing training is to be examined.

4. Resolution of Intracerebral Language Processing Mechanism while Shadowing

NIRS: near-infrared spectroscopy is one of the medical machines that examine brain activities by measuring changes of bloodstream in brain non-invasively with near-infrared, which is generally called Optical Topography. The purpose of this study is to resolve the differences of intracerebral language processing mechanism among each method by measuring changes of bloodstream in brain and to determine the difference of brain parts that activate according to the method and the text level while Japanese native speakers that study English as a foreign language are practicing shadowing repeating, listening, oral

reading and silent reading in order to suggest each English learner the most effective method of learning English scientifically.



Figure 9. Measuring with NIRS

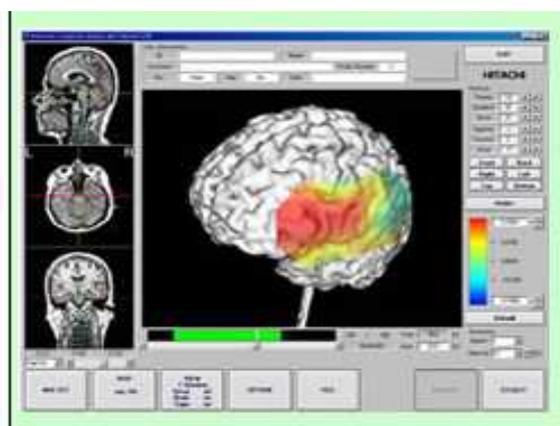


Figure 10. Image of Analyzing Bloodstream in Brain

The author visited Dr. Masahiro Nakagawa, the professor of the chaos and fractals informatics laboratory, the department of technology, Nagaoka University of Technology on August 25th, 2010, and learned how to use NIRS.

The future study plan is as follows: targeted for English learners working on shadowing, repeating and so on, (1) measuring the concentration of hemoglobin in the intracerebral blood by NIRS, (2) measuring EEG (Electroencephalogram) by EEG (Electroencephalograph), (3) analyzing brain activity quantitatively by chaos and fractals analysis of the concentration of hemoglobin of the intracerebral blood and EEG, (4) analyzing the effects of English learning such as shadowing and repeating quantitatively.

According to the above procedure, it is ultimately aimed to find out the most effective English learning method and the text level for each English learner. This research is being supported by measuring the intracerebral bloodstream and EEG and analyzing the data by Dr. Masahiro Nakagawa, the professor of the department of technology, Nagaoka University of Technology.

This research is also being supported by the psycholinguistic theory of shadowing training by Dr. Shuhei Kadota, the professor of the graduate school of language, communication and culture, Kwansei Gakuin University.



Figure 11. Fixed type EEG (Electroencephalograph)

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