Effects of Multimedia Vocabulary Annotations and Learning Styles on Vocabulary Learning

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ABSTRACT
This first goal of the study described here was to investigate the effectiveness of three types of vocabulary annotations on vocabulary learning for EFL college students in Taiwan: text annotation only, text plus picture, and text plus picture and sound. The second goal of the study was to determine whether learners with certain perceptual learning styles benefited more from a particular type of vocabulary annotations. The perceptual learning styles investigated were auditory, visual-verbal (with text), visual-nonverbal (with pictures), and mixed preferences. The results of the study showed that the version with text plus picture was the most effective type of vocabulary annotation. Perceptual learning styles did not seem to have a significant influence on the effectiveness of vocabulary annotations.

KEYWORDS
Multimedia Annotations, Vocabulary Learning, Perceptual Learning Styles, English as a Second/Foreign Language, College Students

INTRODUCTION
In Taiwan, vocabulary learning has been very problematic for students studying English as a foreign language (EFL). Because of students’ inadequate knowledge of vocabulary, many have difficulties comprehending language input. According to an estimate offered by Li (1987), Taiwanese senior high school graduates should have a vocabulary of roughly 5000-7000 words. However, Chen (1998) indicated that the vocabulary size of 60-70% of the senior high graduates in his study was only 2000-3000 words. This large gap certainly suggests that teachers and learners will have to spend a considerable effort on vocabulary teaching and learning.

CALL represents one potentially powerful method for increasing language learners’ vocabulary size due to its capacity for multimedia presentation of glossary annotations. For example, Chun and Plass (1996) described courseware that provided three versions of visual vocabulary annotations (a) text, (b) still images,
and (c) series of pictures. However, most CALL projects have not taken into account individual elements in learners such as perceptual learning styles. As Kroonenberg (1995) noted, perceptual learning styles significantly affect language acquisition. Kost, Foss, and Lenzini (1999) suggested that learners’ preferred learning style should be further explored so that the design of vocabulary annotation can better facilitate individualization of course materials. Therefore, the purpose of the study presented here is to investigate the effectiveness of various types of vocabulary glossary annotations in association with learners’ perceptual learning styles.

LITERATURE REVIEW

In this section, literature in three areas will be reviewed: the effectiveness of dual presentation of vocabulary annotation, perceptual learning styles, and the comparison of visual and auditory effect of vocabulary learning.

Dual Presentation of Vocabulary Annotations

Davis (1989) noted the advantage of hypertext annotations when readers have access to vocabulary information such as pronunciation, video, text, and graphics. Martinez-Lage (1997) also suggested that in addition to the huge amount of information provided by such annotations, CALL also offers two other advantages for vocabulary learning: images can assist viewers to reject or confirm their previous hypothesis about a word, and they have additional opportunities to interact with the text.

The series of studies conducted by Chun and Plass (1993; 1996), Plass, Chun, Mayer, and Leutner (1998), Kost, Foss and Lexini (1999), Yoshii (2001), and Al-Seghayer (2001) consistently evidenced the effectiveness of dual presentation types of vocabulary annotations (text + visual aids) on vocabulary learning. The studies conducted by Chun and Plass revealed (a) that the participants preferred visual aids (video and still pictures), (b) that they acquired more words with annotations of text and picture than the other two groups with text only or text plus video annotations, and (c) that visualizers performed significantly better on words that reminded them of visual cues then those that reminded them of verbal cues, whereas verbalizers showed the opposite pattern.

Later, Kost et al. (1999) also supported the effectiveness of dual annotation—textual and pictorial glosses on vocabulary. They glossed vocabulary with three different methods: English translations only, pictures only, and both English translation and pictures. Their results supported earlier studies because students who received both textual and pictorial glosses performed better in immediate recognition tasks than the other two groups (picture-only or text-only glosses). Yoshii’s study (2001) presented similar results: text + picture was the most effective type for immediate and delayed tests among text-only, picture-only, and text + picture annotations. Finally, Al-Seghayer (2001) focused on the effectiveness of still-picture and video visual aids and compared findings with those of Chun and Plass’ studies (1993; 1996). Text + video clip annotations were the most helpful...
among text only, text + still picture, and text + video clip annotations.

Underwood (1989) suggested that “A commonplace principle of human learning is visual memory. We remember images better than words, hence we remember words better if they are associated with images.” The studies mentioned above affirm that multimedia annotations (images and text) benefit students more than single-medium glosses. Therefore, to assist students on vocabulary learning, designers of multimedia courseware would be well advised to provide learners access to associated images of target vocabulary.

**Perceptual Learning Styles**

Students have different perceptual learning styles—different sensor preferences for processing information (Kinsella, 1995). Some students, categorized as auditory learners, tend to process information through listening to instruction via lectures, tapes, or films. Other learners prefer to process information by reading printed material silently, while still others receive information better by association with charts, images, and graphs. These learners are categorized as visual/verbal and visual/nonverbal learners, respectively. The design of vocabulary annotations with both images and text does not fully support individualization for students using CALL materials because dual presentations do not ensure that individuals with different perceptual learning styles are equally empowered. To help students with different perceptual learning styles, courseware designers need to take their perceptual strength into consideration to facilitate learning.

Teaching to learners’ perceptual learning style does help students. Kroonenberg (1995) conducted experiments and offered suggestions to achieve this goal. Like Kroonenberg, Kinsella (1995) suggested that the first step of teaching to learners’ perceptual preference is to identify learners’ preferences because “A knowledge of one’s own learning style is fundamental in learning to learn.” Kinsella also pointed out that “a modality strength may occur in a single channel, for example, visual, or be mixed, involving two or more channels.” Learners can therefore be grouped as those with a distinctive preference—visual/verbal, visual/nonverbal, auditory—or those without marked preference(s)—visual/verbal and visual/nonverbal, visual/nonverbal and auditory, visual/verbal and auditory, and mixed. Thus, for example, with respect to vocabulary courseware, pictorial and text information should be equally beneficial for learners with mixed preferences of visual/verbal and visual/nonverbal.

**Native Language Influence**

Some empirical studies on Chinese EFL learners’ strategy use on vocabulary acquisition have confirmed Kroonenberg’s (1995) assumption of Chinese EFL learners’ visual preference from various perspectives.
Huang and Hanely’s study (1994) indicated that the phonological awareness and visual skills differed among students in primary schools due to L1 orthography. They examined participants’ phonological awareness, visual skills, and reading ability with two reading tests and found that there was a high correlation between Chinese reading and visual skill tests for Chinese participants. The relationship between phonological awareness and reading in Chinese children of this age was much less direct than it was for British children who were learning to read English. Due to the influence of the nature of orthography, visual skills were a powerful predictor for Chinese reading proficiency, while phonological awareness was highly correlated with English reading proficiency.

Chen (1999) also compared the effect of auditory and visual stimuli in computer-assisted vocabulary acquisition by Chinese speakers, hypothesizing that visual stimuli were more effective than auditory ones. The results of this study supported the researcher’s hypothesis that visual stimuli would be more effective than auditory ones.

In sum, the studies on perceptual preference of Chinese EFL/ESL learners have shown that these learners have a visual preference for learning and that they use visual learning strategies better than auditory strategies. Therefore, although multimedia vocabulary annotations are more effective than single-media annotations for vocabulary acquisition, individual visual or audio annotations may not be equally effective to all learners.

Based on this review of the literature, the research questions of this study are as follows:

1. Among the three types of vocabulary annotation—text annotation, text + image annotation, and text + image + sound annotation, which one is the most effective for vocabulary acquisition by Chinese EFL learners?
2. Will learners with certain perceptual learning styles prefer a certain version of vocabulary annotations?

RESEARCH METHODOLOGY

This section includes two parts: a brief description of the instructional design of the learning instrument—courseware entitled Thanksgiving—and the research procedures.

Instructional Design

The courseware was designed to enhance cultural understanding of Thanksgiving, one of the important holidays in western countries. In the courseware, the researcher annotated vocabulary with different types of glossaries for the study.

To explore the effectiveness of different types of vocabulary annotations, three versions of the courseware were created: (a) Chinese translation and English explanation—text only annotation, (b) text annotation and a still image associated with the target vocabulary, and (c) text annotation, image, and an audio annotation—a native speaker first reading the word, then spelling the word, and finally
The participants on the study were randomly assigned to use one of the three versions. Participants in the first group used the version with word annotations consisting of a Chinese translation and English explanation. Those in the second group used the version with the same textual annotations and a still image associated with the vocabulary item. For instance, for the word “reunion,” the picture in Figure 1 accompanied the textual annotation.

Figure 1
Picture for “reunion”

The participants in the third group viewed not only both text + picture annotations, but also listened to an audio annotation. For the word “reunion,” the participants heard a native speaker read “reunion,” spell “r-e-u-n-i-o-n,” and then the sentence “Traditionally, Thanksgiving is a day for family reunion and feasting.”

Research Procedures
Participants
The participants in this study were 82 freshmen from the Department of Material Science and Technology and the Department of Chemistry at the National Tsing Hua University in Taiwan. Before this study began, they had already completed 6 years of formal English instruction at secondary education level. During the study, they were enrolled in the course Freshman English.

Learning Medium and Instrument
The researcher employed the Thanksgiving courseware as the learning medium. When using the courseware, participants had the access to vocabulary annotations by clicking on the words presented in a different color. When they did so, a window popped out, showing the annotations described above.

The instruments employed in the study consisted of two questionnaires and two tests. The participants took a pen-and-paper pretest on the key vocabulary presented in the courseware and completed a questionnaire on their perceptual learning styles: auditory, visual/nonverbal, and visual/verbal. The questionnaire...
was translated into Chinese from the one created by Kinsella (1995) with her permission. After using the courseware, the participants took a pen-and-paper vocabulary posttest and completed a questionnaire on the design of the courseware. The researcher followed up the questionnaire with student interviews.

Data Collection

There were two stages of data collection. In the first stage, the researcher collected whole class data on the pretest and the questionnaire on perceptual learning styles. The pretest focused on the definitions of some of the new vocabulary participants would see in the courseware. The time interval between the pretest and the posttest ranged from 4 to 14 days.

In the second stage, participants individually used the courseware, took the posttest, and completed the questionnaire soliciting their comments on the courseware. Before using the courseware, the participants received instructions on the structure of the courseware, how to enter and exit the courseware, and what they could expect to see. Each individual spent at most an hour on the activities in this second stage. The posttest included three tasks: word association questions, multiple choice questions on word meanings, and a cloze test. The reading passage of the cloze test was also about Thanksgiving, and, to help the participants, the English definition of the missing words was offered under each blank. After taking the posttest and completing the questionnaire, the researcher conducted a short interview to probe for further information not be available from answers to the questionnaire items.

RESULTS

Effectiveness of Vocabulary Annotations

Analyses of the participants’ performance on the posttest indicated that the version of the courseware with the text + picture annotations was the most effective for vocabulary learning. Table 1 shows the mean scores on the posttest.

Table 1
Group Means of the Posttest Scores

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (text only)</td>
<td>22.44444</td>
</tr>
<tr>
<td>(n = 27)</td>
<td></td>
</tr>
<tr>
<td>Group 2 (text + picture)</td>
<td>23.41071</td>
</tr>
<tr>
<td>(n = 28)</td>
<td></td>
</tr>
<tr>
<td>Group 3 (text + picture + audio)</td>
<td>20.66667</td>
</tr>
<tr>
<td>(n = 27)</td>
<td></td>
</tr>
<tr>
<td>All groups</td>
<td>22.18902</td>
</tr>
<tr>
<td>(n = 82)</td>
<td></td>
</tr>
</tbody>
</table>
An ANOVA was conducted to further determine if the effectiveness of the three versions were significantly different (see Table 2).

### Table 2
ANOVA of the Posttest Scores

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect</td>
<td>2</td>
<td>11.794</td>
<td>5.897</td>
<td>3.485*</td>
</tr>
<tr>
<td>Error</td>
<td>79</td>
<td>133.688</td>
<td>1.692</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05

The ANOVA analysis revealed that the effectiveness of the three versions on vocabulary acquisition was significantly different. Further analysis was conducted to compare pairs: versions 1 and 2, versions 2 and 3, and versions 1 and 3. Fisher’s LSD was selected as the tool for pair comparison. The results are shown in Table 3.

### Table 3
Fisher’s LSD

LSD = 0.7

Reject $H_0$ if $x_1 - x_2 >$ LSD

$x_1 - x_2 = 0.32 < 0.7$ accept

$x_2 - x_3 = 0.91 > 0.7$ reject

$x_1 - x_3 = 0.59 < 0.7$ accept

The analyses by Fisher’s LSD indicated that the differences between the two pairs—version 1 versus version 2 and version 1 versus version 3—were not significantly different. This is not the case for the contrast between version 2 and version 3. The participants using version 2 significantly outperformed those using version 3. In sum, version 2—text plus a still picture—was the most helpful.

**Learning Styles and Effectiveness of Annotations**

To answer the second research question—whether perceptual learning styles influence the effectiveness of annotations—the researcher categorized the participants into five learning categories: (a) visual/verbal, (b) visual/nonverbal, (c) auditory, (d) visual/verbal and visual/nonverbal (i.e., visual learners), and (e) auditory/visual/nonverbal (i.e., a mixed group). The participants were categorized visual/nonverbal when they had marks of at least 2 points higher in the visual/nonverbal category than in visual/verbal and auditory categories on the perceptual learning styles questionnaire. Visual/verbal learners were those whose scores...
Multimedia Vocabulary Annotations and Learning Styles

were at least 1 point higher in the visual/verbal category than in the auditory and visual/nonverbal categories. As for auditory learners, they were the participants who had a score at least 1 point higher in the auditory category than in the other two. Participants who had similar scores in visual/nonverbal and visual/verbal categories and relatively lower auditory scores were placed in the visual category. As for the auditory/visual/nonverbal group, they were the participants whose auditory, visual/verbal, and visual/nonverbal scores were quite similar.

The distribution of the participants’ scores in the questionnaire showed that, out of a maximum of 24 points, most participants had 12 to 16 points in the auditory category, 13 to 15 in visual/verbal, and 14 to 17 in visual/nonverbal. These results showed students’ visual tendencies were stronger than their auditory tendencies. Moreover, they tended to learn better with pictures than with text alone. Table 4 shows the number of participants in each version and learning style.

Table 4
The Distribution of Participants Over the Various Categories

<table>
<thead>
<tr>
<th>Group</th>
<th>Auditory</th>
<th>Visual/verbal</th>
<th>Visual/nonverbal</th>
<th>Visual/verbal &amp; visual/nonverbal</th>
<th>Auditory/visual/nonverbal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Group 2</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>Group 3</td>
<td>4</td>
<td>4</td>
<td>11</td>
<td>5</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>14</td>
<td>32</td>
<td>12</td>
<td>12</td>
<td>81</td>
</tr>
</tbody>
</table>

The results of the study described here showed that except for auditory/visual/nonverbal group, there seems to be little correlation between the three versions of the courseware and learning styles. The participants in the auditory/visual/nonverbal group using the text + picture version significantly outperformed those using the text-only version. Table 5 lists the mean scores of the participants using the three versions of the courseware by the five learning styles.

Table 5
Mean Posttest Scores by Courseware Version and Learning Styles Categories

<table>
<thead>
<tr>
<th>Group</th>
<th>Auditory</th>
<th>Visual/verbal</th>
<th>Visual/nonverbal</th>
<th>Visual/verbal &amp; visual/nonverbal</th>
<th>Auditory/visual/nonverbal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (text only)</td>
<td>7.96</td>
<td>7.67</td>
<td>7.67</td>
<td>7.49</td>
<td>5.25</td>
<td>7.20</td>
</tr>
<tr>
<td>Group 2 (text + picture)</td>
<td>6.83</td>
<td>7.92</td>
<td>7.26</td>
<td>8.72</td>
<td>8.43</td>
<td>7.83</td>
</tr>
<tr>
<td>Group 3 (text + picture + audio)</td>
<td>6.42</td>
<td>5.79</td>
<td>7.27</td>
<td>6.97</td>
<td>6.67</td>
<td>6.67</td>
</tr>
<tr>
<td>Total</td>
<td>7.09</td>
<td>7.24</td>
<td>7.42</td>
<td>7.62</td>
<td>7.46</td>
<td>7.38</td>
</tr>
</tbody>
</table>
ANOVA analyses of the posttest scores revealed that participants with mixed learning styles who viewed certain version(s) significantly outperformed those using the other versions (see Table 6).

Table 6
ANOVA Analysis of Posttest Scores by Learning Styles Categories

<table>
<thead>
<tr>
<th></th>
<th>d. f. effect</th>
<th>MS effect</th>
<th>d. f. error</th>
<th>MS error</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Version</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 1</td>
<td>4</td>
<td>2.76</td>
<td>21</td>
<td>1.48</td>
<td>1.87</td>
<td>0.15</td>
</tr>
<tr>
<td>Version 2</td>
<td>4</td>
<td>2.71</td>
<td>22</td>
<td>1.27</td>
<td>2.14</td>
<td>0.11</td>
</tr>
<tr>
<td>Version 3</td>
<td>4</td>
<td>2.45</td>
<td>23</td>
<td>1.84</td>
<td>1.33</td>
<td>0.29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning styles</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory</td>
<td>2</td>
<td>2.51</td>
<td>8</td>
<td>1.91</td>
<td>1.32</td>
<td>0.32</td>
</tr>
<tr>
<td>Visual/verbal</td>
<td>2</td>
<td>5.93</td>
<td>11</td>
<td>2.08</td>
<td>2.86</td>
<td>0.10</td>
</tr>
<tr>
<td>Visual/nonverbal</td>
<td>2</td>
<td>0.13</td>
<td>25</td>
<td>1.05</td>
<td>0.13</td>
<td>0.88</td>
</tr>
<tr>
<td>Visual/verbal &amp;</td>
<td>2</td>
<td>2.89</td>
<td>9</td>
<td>1.72</td>
<td>1.68</td>
<td>0.24</td>
</tr>
<tr>
<td>Visual/nonverbal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auditory/visual/nonverbal</td>
<td>2</td>
<td>9.11</td>
<td>9</td>
<td>1.44</td>
<td>6.33</td>
<td>0.02</td>
</tr>
</tbody>
</table>

A Sheffe test was then conducted to compare the auditory/visual/nonverbal group’s scores using the three versions of the courseware (see Table 7).

Table 7
Sheffe Test of the Auditory/visual/nonverbal Group

<table>
<thead>
<tr>
<th></th>
<th>Version 1</th>
<th>Version 2</th>
<th>Version 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>5.25</td>
<td>8.43</td>
<td>6.67</td>
</tr>
<tr>
<td>Version 1</td>
<td></td>
<td>0.03</td>
<td>0.46</td>
</tr>
<tr>
<td>Version 2</td>
<td>0.03</td>
<td></td>
<td>0.16</td>
</tr>
<tr>
<td>Version 3</td>
<td>0.46</td>
<td>0.16</td>
<td></td>
</tr>
</tbody>
</table>

As the figures in Table 7 show, the participants in auditory/visual/nonverbal group using version 2 (text + picture) significantly outperformed those using the text only version.

In sum, the results of the study indicate that the most helpful type of vocabulary annotation for vocabulary learning was text annotation plus an associated still picture. To users with mixed learning styles, this version was also the most effective one among the three.
DISCUSSION

The Relative Ineffectiveness of Dual Presentation Plus Audio Annotation

There could be two reasons for the apparently relative ineffectiveness of the third version of the courseware (text + picture + audio): the transfer of L1 processing mechanism and the audio annotation itself.

First, the learning styles employed in learning Chinese came into play in learning English. As mentioned above, most participants—college students in Taiwan—tended to obtain information visually and preferred pictorial stimuli. They were not as strong when learning through auditory channels, as evidenced by the lower marks in auditory learning styles in the questionnaire on perceptual learning styles. In addition, empirical studies (Chen, 1998) demonstrated that Chinese EFL learners employed visual strategies more frequently than English native speakers and were relatively less skillful in using phonological strategies. Huang and Hanley (1995) also pointed out that learning to read Chinese depended highly on visual skills. EFL learners in Taiwan therefore could have tried to memorize the orthography of English words without following auditory strategies. It is therefore possible that the participants in the current study tended to learn visually and did not process information through the audio channel. This transfer of visual strategies from the L1 might explain why the sound annotation in the text + picture + audio version was not so beneficial.

Second, the fast speech rate of the recorded annotation and the time limit for completing the task could have lowered the effectiveness of the text + picture + sound annotation as well. During the interviews, the researcher learned that the speech rate in the text + picture + sound annotation was too fast for the participants. Since the participants were not accustomed to employing auditory skills in learning English, they could have perceived the sound annotations as distracting, instead of facilitating, because the rate of speech exceeded their listening proficiency.

Finally, because the same amount of time was given to completing the tasks of using the courseware, taking the posttest, and doing the interview, the participants assigned to the text + picture + sound version had to devote additional time listening to the sound annotation and less time on text and picture annotations, the result of which was that these participants might not have learned as many vocabulary items as possible.

CONCLUDING REMARKS

This study investigated the effectiveness of three types of vocabulary annotation: text only, text + picture, and text + picture + auditory annotations. Pair-wise comparisons revealed that the group assigned to view the version with text + picture annotation performed best. These results are generally consistent with previous studies (Chun & Plass 1993, 1996; Kost, Foss, & Lenzini, 1999). The relative ineffectiveness of text + picture + auditory annotation may be attributed to the
influence of the L1 and the rate of speech of the audio annotations.

As shown in the distribution of the participants’ marks in the questionnaire on perceptual learning styles, Chinese ESL/EFL learners preferred visual stimuli over auditory stimuli. These results suggest that the influence of the learners’ perceptual preference on the effectiveness of vocabulary annotation types to vocabulary learning was not evident.

**Pedagogical Implications**

Two pedagogical implications can be drawn from this study. First, since Taiwanese EFL learners show a strong preference for visual stimuli, it is suggested that English instructors/courseware designers employ a dual presentation mode as often as possible for vocabulary learning. They should present new vocabulary, especially for concrete objects, with a still picture alongside its English explanation and Chinese definition. Second, Chinese EFL learners would benefit from raised phonological awareness of the correspondence between spelling and pronunciation. It would be beneficial for English instructors to train learners to learn from audio stimuli since Reid’s (1987) study suggested that the stronger learners’ audio preference, the higher their English proficiency. Moreover, instructors may wish to tell learners how spelling corresponds to pronunciation and explicitly teach them the way of associating sounds with spelling in English.

**The Limitations of the Study**

Some limitations in the study emerged regarding participant variables and the test instruments.

First, there was not an adequate number of participants in each of the groups for the final analysis. The study focused on two aspects of vocabulary learning: annotations and perceptual learning styles. Further subdivisions of the participants—five perceptual learning styles and three types of vocabulary annotations—resulted in 15 categories in the analysis. With a total of 82 participants, each category had on average fewer than 6 participants, ranging from 2 to 11 participants per category. The sample size in each category was not large enough for complete analysis.

Second, the participants shared similar backgrounds. All of them had completed 6.5 years of English instruction at the time the experiment began. In addition, they were studying similar majors in science and engineering at the same university. To have a clearer picture of Taiwanese college students’ perceptual learning styles, the study presented here should be replicated with learners of various majors and age ranges at different institutions.

Another limitation was the test instrument used. Since the researcher was investigating the effectiveness of the auditory annotations, a dictation type of test might have better helped the performance of those participants who learned with audio annotations.
Suggestions for Future Research

The limitations of the study and the researcher’s own reflections yield suggestions for future research, including participants, speed of audio annotations, further study of the L1 influence on vocabulary learning, and test instruments. Enlarging the sample size taking various factors into account—academic major, age, the length of English instruction—should allow future researchers to offer more insightful generalizations on the effectiveness of vocabulary annotation and the investigation of perceptual learning styles. Future researchers should also either recruit more participants or reduce the number of variable categories so that the sample size in each group will be sufficiently large. In addition, when conducting similar research on auditory annotation, the speed of the speech should be carefully controlled, perhaps by making the speed controllable by viewers or asking the speakers to lower their speed for the annotation. Further investigation into L1 influence on vocabulary learning should be conducted because the nature of the target and the native languages led to obstacles in the current study. Finally, future researchers may wish to employ dictation type of questions so that the performance of participants learning with audio annotations could be more accurately measured.

REFERENCES


AUTHORS’ BIODATA

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