

## Technical University Learners' Ability, Difficulties in Lexical Inference and Perception of Strategy Use

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### Abstract

This study investigated EFL technical university learners' ability, difficulties, and strategy use in lexical inference. It also examined whether learners with different L2 proficiency would reveal different difficulties and strategy use. Data were collected from 120 EFL non-English major learners' retrospections immediately after a lexical inference test as well as a survey on a vocabulary strategy questionnaire. The self-descriptive data collected from the *incorrect* answers were analyzed, according to Nassaji's category (2003), to examine the students' difficulties in the use of knowledge sources. Results indicated that Technical University learners' lexical inference ability was inadequate. Most of them particularly had difficulty in using world knowledge and morphological knowledge to infer the word meaning. The high-frequency-used strategies were "slowing reading rate," "using prior knowledge," and "recognition of cognates." A significant difference was found between the learners with different proficiency ( $p < .01$ ). Discussions and implications for pedagogy and further research were also presented.

**Keywords:** lexical inference; ability; difficulties; strategy use.

### 1. Introduction

Researchers in L1 and L2 vocabulary acquisition have indicated the value of deriving word meaning from context (e.g. Buikema & Graves, 1993; Carnine, Kameenui, & Coyle, 1984; Read, 2000). Contextually inference is considered to be a compensation strategy for EFL reading. Compensation strategies enable students to make up missing knowledge in the process of comprehending the target language. According to Oxford (1990), guessing intelligently in reading, also called "inference," involves using a variety of linguistic and nonlinguistic clues to guess the meanings when the learner does not know all the words.

While some previous studies indicated the benefits of using contextual inference for word meaning, others still argued its limitations. While other researchers provided various factors which would contribute a successful lexical inference, including the context factors (Diakidoy & Anderson, 1991; Frantzen, 2003), the student factors (Frantzen, 2003; Levine & Reves, 1998; Mckeown, 1985) and the text factors (Hu & Nation, 2000; Laufer, 1997; Shefelbine, 1990), De Bot et al. (1997) found that when attempting to infer word meaning from context, L2 learners used knowledge sources ranging from knowledge of grammar, morphology, phonology, and knowledge of the world, to knowledge of punctuation, word association, and cognates. Nassaji (2003) further emphasized that successful lexical inference depends on how various kinds of knowledge sources connect to strategies. However, very little attention has been paid to investigate the learners' difficulties in using knowledge sources for word meaning inference.

Thus, this exploratory study attempted to investigate what knowledge source technical university learners lack and what strategies they usually adopt when encountering vocabulary comprehension breakdown. This study addressed the following questions:

1. How is the technical university learners' lexical inference ability? What difficulties do they have in using knowledge sources for lexical inference? Is there any difference

across proficiency?

2. How do the technical university learners use lexical inference strategies when they have vocabulary comprehension breakdown? Is there any difference across proficiency?

## 2. Literature Review

### 2.1. Knowledge Sources and Lexical Inference in L2 Reading

Context clues are very important for comprehending text as well as learning new words. Nation and Coady (1991) defined context as "morphological, syntactic, and discourse information in a given text which can be classified and described in terms of general features" (p. 102). Although contextual clues may provide much of the information, its effective use also depends on the learners' use of knowledge sources.

A number of recent studies have documented the range of knowledge sources that learners use during lexical inference. For example, Schmitt and McCarthy (1997) distinguished three categories of knowledge sources that contribute to effective use of context, namely: *linguistic knowledge*, *world knowledge*, and *strategic knowledge*. *Linguistic knowledge* includes syntactic knowledge, vocabulary knowledge, and word schema. The syntactic constructions are considered to provide information to learners at any stages of language acquisition. To infer the meaning of an unknown word, it is helpful to know the meanings of the words around it. *World knowledge* refers to the readers' background knowledge on what constitutes a word. There is evidence indicating that "both children and adult have some sense of what constitutes a possible, or at least plausible, word meaning" (p. 78). *Strategic knowledge* is the third category of knowledge that involves conscious control over cognitive resources. The success of training contextual inference strategies, as shown in several previous studies, highlights the potential efficiency of focusing on strategic knowledge.

Nassaji (2003) further categorized four types of knowledge sources: i.e., grammatical knowledge, discourse knowledge, world knowledge and morphological knowledge. In this category, grammatical knowledge refers to using syntactic categories or grammatical functions such as relative clause (modification clue), verbs or adjectives. Discourse knowledge includes using knowledge of relation between or within sentences and the connectors between words or sentences such as restatement clues, cause /effect clues, example clues and explanation clues. World knowledge involves using the preexisting schemata to infer the word meaning. Morphological knowledge refers to the internal clue such as the prefixes and suffixes.

There is evidence that no single knowledge source contributes to a successful inference. In a study with university students, De Bot, Paribakht, and Wesche (1997) found that successful inference depends upon various knowledge sources ranging from knowledge of grammar, morphology, phonology, and knowledge of the world, to knowledge of punctuation, word association, and cognates. Nassaji (2003) further emphasized that successful lexical inference depends on how various kinds of knowledge sources and strategies coverage and link. Furthermore, he proposed an inference model that distinguishes between strategies and the ability to use them appropriately and effectively in conjunction with various sources of knowledge. His findings challenged a uni-dimensional conception of the role of strategies in L2 lexical inference, suggesting that success in lexical inference might depend on an effective use of strategies in combination with the use of other knowledge sources in and outside the text.

With regards to the L2 readers' proficiency, Bengelil and Paribakht (2004) indicated that the different proficient groups used the same knowledge sources and contextual cues; however, word association (intralingual source) was used less frequently by the intermediate

(not advanced) participants. Moreover, their finding showed that the more advanced readers made more correct and partially correct inference than the intermediate-level readers. Further to the study of De Bot et al. (1997), they also emphasized the importance of using a variety of knowledge sources as well as on several other sources, such as linguistic (e.g., intralingual and interlingual sources) and non-linguistic sources (e.g., knowledge of topic).

Given the importance of knowledge sources combined with strategy use for successful lexical inference, this study sought to investigate how they are related to EFL technical university learners with different L2 proficiency. Unlike the previous research examining what the successful learners did, this present study explored why the learners failed in guessing and how they did during the inference process. In other words, this study investigated how the knowledge sources were used and related to L2 learners' performance in word meaning inference.

## ***2.2. Awareness of Metacognitive Strategy in SLA***

In the last decade, SL/FL reading research has been characterized by a process-oriented approach to comprehension based on the work of cognitive psychology. Brown (1978) defined metacognitive awareness as "knowing what you know and what you don't know." It is assumed that the effective use of a strategy expands learners' strategic knowledge and/or reinforces what they already know. That is, "active monitoring and consequent regulation and orchestration of cognitive process to achieve cognitive goals" (Flavell, 1976, p.252). Before learning, learners should have the awareness to know the purposes why they are going to learn, and then arrange their learning ways. During the learning process, they should be able to monitor if their efforts made with appropriate skills and strategies, and then eventually, they should know how to modify the learning process through the self-evaluation.

Moreover, Wenden (1998) suggested that learners of different ages and learning proficiency will have acquired some metacognitive knowledge about learning, which influences their approach to learning and the expectations they hold about the outcome of their efforts. When a learner applies acquired knowledge and skills used in a previous task to the completion of a present task (learning transfer), according to Wenden (1998), metacognitive knowledge facilitates the appropriate choice of previously learned strategies to achieve learning goals and to deal with problems encountered during the learning. Thus, reciprocally, this metacognitive awareness helps motivate the readers to use strategies, and furthermore to transfer effective strategies to other contexts as needed.

Furthermore, metacognition can be defined as "thinking about thinking" (Anderson, 2002a, p1). To further understand the metacognition, Anderson's (2002a) suggested five primary components in metacognition as follows: (1) preparing and planning for learning, (2) selecting and using learning strategies, (3) monitoring strategy use, (4) orchestrating various strategies, and (5) evaluating strategy use and learning. Anderson also indicated that "the use of metacognitive strategies ignites one's thinking and can lead to more profound learning and improved performance, especially among learners who are struggling" (Anderson, 2002a, p1).

Current research in reading and vocabulary learning has advocated the use of metacognitive strategies in the reading process (Block, 1992). Parry (1997) investigated two advanced ESL students' handling vocabulary in reading a text and found that they used quite different reading strategies, either holistic or analytic one. Since neither approach was fully satisfactory, she, thus, concluded that ESL students needed to develop metacognition, determining which strategy is more effective than the other. In Rasekh and Ranjbar's (2003) research on metacognitive strategy training for vocabulary learning, the finding also showed that "metacognitive strategies instruction has positive impact on the lexical

knowledge development of EFL students” (p11). Thus, reader’ metacognitive awareness, monitoring, and the use of strategies play an important role during the comprehension process.

### 3. Research Method

#### 3.1. Participants

This study involved 120 freshmen students at a technical university in the central part of Taiwan. They graduated from 3-year vocational high schools in different parts of Taiwan. They all took a GEPT reading comprehension test at intermediate level to check their reading comprehension performance. This study adopted an authentic GEPT<sup>1</sup> reading test at intermediate level used in Taiwan in 2006. Among the participants, none of them received the score of 80 points, the threshold score to pass the intermediate test. Thus, those who scored below 60 were designated as the low proficiency group, while the average group involved learners who scored between 60 and 80 points. Table 1 presents the demographic overview for participants.

Table1. *Demographic overview for participants*

Background	Number	Percentage
English majors	42	35.0 %
Engineering majors	78	65.0%
Average proficiency	39	32.5%
Low proficiency	81	67.5%

#### 3.2. Data Collection Procedures & Instruments

There were two stages for the data collection procedures. At the first stage, all groups of participants took a lexical inference test (as shown in 3.2.2). Then, students immediately responded to a vocabulary strategy questionnaire by indicating to what extent they used the strategy to deal with the target words.

##### 3.2.1. The Reading Passage

The reading passage, an approximately 500-word narrative, was selected from *Open Book* (Lynne Gaetz, published by Longman, 2002). The reading passage was chosen according to the following criteria (Nassaji, 2003): (1) *Student factors* (Frantzen, 2003; Levine & Reves, 1998; Mckeown, 1985)--The text matched the comprehension ability of the low-intermediate readers because the reading book had been used for Freshmen English for several years (*Student factors*) and is about 8<sup>th</sup> to 9<sup>th</sup> grade difficulty level according to Fry’s Readability Graph.; (2) *Text factor* (Hu & Nation, 2000; Laufer, 1997; Shefelbine, 1990)--The text was relevant to students’ real-life experience with its topic looking at the rental problem in the college life; (3) *Context factors* (Diakiday & Anderson, 1991; Frantzen, 2003)--Twelve words were identified and underlined based on different knowledge sources (Nassaji, 2003) for lexical inference.

##### 3.2.2. Lexical Inference Test

There were 12 underlined words in the reading texts, in which every target word was identified as one category of knowledge resources based on the most prominent context factor involved in it (Appendix I). Based on Nassaji’s category (2003), this study categorized the knowledge sources as grammatical knowledge (word parts, modifier), morphological

<sup>1</sup> GEPT at intermediate level, a nationally-norm standardized test, is used to evaluate Taiwanese students’ English proficiency after three-year senior high school. The reading section consists of 15-item sentence structure and 25-item reading comprehension test. The full score is 120.

knowledge (prefix, suffix), discourse knowledge (e.g. using knowledge of relation between or within sentences) and world knowledge (preexisting schemata). Among the target words, there were three words designed for each category. The students were first required to recognize the word and write its meaning without context. They also indicated if they guessed the meaning or they knew the word. Then, they read the text and recognized the target words with context again. Moreover, they were asked to mention any knowledge source they used to work out the meaning of unknown words. The self-descriptive data collected from the incorrect items were further analyzed to examine the factors (i.e., deficiency in grammatical knowledge source) which might cause wrong guessing. The internal consistency of the resulting instrument was .81, which was measured by test-retest method.

### **3.2.3. Vocabulary Strategies Questionnaire**

Based on the interconnection of cognition and metacognition (O'Malley & Chamot, 1995), a vocabulary strategies questionnaire, a 22-item Likert-type instrument adapted from Mineishi (1997), was designed and administered to investigate the students' perceptions of strategy use for the unknown words. Following Block's (1992) cognitive processing model of L2 lexical inference, which incorporates a generator and evaluator component and a metalinguistic control component, this study further categorized the 25 items into two parts: cognitive strategies (e.g. guessing, analyzing, and reasoning) and metacognitive strategies (e.g., planning, monitoring, evaluation). Part one includes a syntactic module, a semantic module, and a text schema module as the generator and evaluator component. To examine the learners' use of strategies to monitor and evaluate the guessing process, part two consists of several monitoring steps that the learners go through during the inferring process.

The questionnaire was sent to two evaluators with statistics background for peer review to determine its content validity. A native speaker of English helped proofread the content for meaning clarity. Item analysis of each item indicated significance, at  $p < .05$  and Cronbach's alpha reliability was .83.

All the students filled out the five-point-scaled *questionnaire* written in English for the unknown words, immediately following the lexical inference test. The instructor read the items aloud to the students and explained each statement to be sure that the students understand what was asked of them.

### **3.3. Data Analysis**

This study analyzed the retrospective data collected both from the lexical inference test and the vocabulary strategy questionnaire. The data from the former were utilized to examine the learners' inference ability and the incorrect guess, whereas the latter investigated the perceptive use of cognitive and metacognitive strategies.

The students' lexical inference ability was evaluated by calculating the numbers of words that were both indicated as "*guess*" and *inferred correctly*. The researcher gave a full credit for related and approximate meaning in hope of encouraging the students to deliberately derive word meaning. Two raters calculated the scores and discussed the solution for the ambiguous meaning. Inter-rater reliability coefficient and test-retest reliability coefficient was .93.

To analyze the EFL learners' difficulties in deriving word meaning, the analysis focused on the items that were indicated as "*guess*" but *guessed incorrectly*, following the category of knowledge sources (grammatical, morphological, discourse and world knowledge). The difficulties each student revealed were identified and interpreted based on the context factors involved in each item. Items 1, 5, and 11 were designated as morphological knowledge; items 2, 7, and 9 involved grammatical knowledge; items 4, 6, and 8 required discourse

knowledge; items 3, 10, and 12 needed world knowledge. All the data were identified, coded and categorized (Pattern, 1990). The data were analyzed and presented as “guess & correct,” “indicated known & correct,” “guess & wrong,” and “indicated known but wrong.” The results were obtained by frequency counts and presented in percentage.

The data from the five-point-scale vocabulary strategies questionnaire were analyzed as five points for “strongly agree” and one point for “strongly disagree.” The students indicated “always” showing that they perceived using the strategy all the time, or “never” revealing using the strategy none of the time. A mean score of five indicated that the students perceived using the strategy all the time, whereas a score of one indicated that the students perceived using the strategy none of the time. To examine how learners with different proficiency levels used the strategies to solve word problems, a *t-test* was calculated to reveal the differences on each variable (items) of the strategy questionnaire and to compare how the two main categories of strategy, cognitive and meta-cognitive, were used by the participants at different proficiency levels.

## 4. Results

### 4.1. *The EFL technical university learners' inference ability and difficulties*

Table 2 shows the learners' inference ability and difficulties in solving the word problems. Successful inference was defined as responses that were indicated “guessing” and received “correctness” with semantic and contextual appropriateness. As shown in Table 2, the percentage of successful inference for each category of knowledge sources was quite low, compared with those received “incorrect guess.” While there was only 26.67 % of success in using world knowledge for word guessing, as much as 52.50% of guessing was incorrect. For the items involving morphological knowledge, there was only 19.17% of successful guessing, while there were 51.11% of incorrect responses. While the percentage of the successful inference using discourse knowledge was only 19.17%, the percentage for all the incorrect items was 46.67%. For the items required grammar knowledge, the successful inference was 21.11%, while the unsuccessful inference was 32.78%. Overall, Table 2 shows that the EFL technical university inference ability was low.

The students' difficulties in inference were further evaluated by analyzing the data that they indicated “guess” but didn't guess the meaning correctly. The results revealed that regardless of L2 proficiency, they all had a higher percentage of incorrect inference in the items that required morphological knowledge and world knowledge. This finding suggested that the world knowledge and morphological knowledge might be two major sources of problems, as shown in Table 2. In other words, the EFL technological university learners might have difficulties in using knowledge sources (i.e., world knowledge) and morphological knowledge to infer word meaning in a reading text.

Further analysis of the data revealed the differences between the two groups at different proficiency levels. As shown in Table 2, the more proficient students had a higher percentage of correct inference and lower percentage of incorrect inference than their less proficient counterparts. In each category of knowledge sources, the less proficient group had a higher percentage of incorrect inference than the more proficient group (53.09% v.s. 47.01%; 37.45% v.s. 23.08%; 53.50% v.s. 32.48%; 59.26% v.s. 38.46%). This means that they had more difficulties in the use of knowledge sources, resulting in higher percentage of incorrect guess. The order of the difficulty factors for the less proficient group was as follows: world knowledge (59.26%) > morphological knowledge (53.50%) > discourse knowledge (53.09%) > grammar knowledge (37.45%). For the more proficient group, however, the order was as follows: morphological knowledge (47.01%) > world knowledge

(38.46%) > discourse knowledge (32.48%) > grammar knowledge (23.08%).

Table 2. EFL Technical University Learners' Difficulties in Solving Word Problems

<i>Knowledge Use</i>	<i>How to Infer</i>	<i>Groups</i>	<i>frequency</i>	<i>percentage</i>	<i>Overall frequency</i>	<i>Overall percentage</i>
Morphological knowledge	Guess & Correct	Less Proficient	20	17.09	69	19.17
		More Proficient	49	20.16		
	Indicated "Known" & Correct	Less Proficient	35	29.91	98	27.22
		More Proficient	63	25.93		
	Guess & Wrong	Less Proficient	129	53.09	184	51.11
		More Proficient	55	47.01		
	Indicated "known" but Wrong	Less Proficient	7	5.98	9	2.5
More Proficient		2	0.82			
Grammar Knowledge	Guess & Correct	Less Proficient	20	17.09	76	21.11
		More Proficient	56	23.05		
	Indicated "Known" & Correct	Less Proficient	54	30.45	128	35.56
		More Proficient	74	46.15		
	Guess & Wrong	Less Proficient	91	37.45	118	32.78
		More Proficient	27	23.08		
	Indicated "known" but Wrong	Less Proficient	22	13.68	38	10.56
More Proficient		16	9.05			
Discourse Knowledge	Guess & Correct	Less Proficient	17	14.53	69	19.17
		More Proficient	52	21.40		
	Indicated "Known" & Correct	Less Proficient	55	22.63	109	30.28
		More Proficient	54	46.15		
	Guess & Wrong	Less Proficient	130	53.50	168	46.67
		More Proficient	38	32.48		
	Indicated "known" but Wrong	Less Proficient	8	6.84	14	3.89
More Proficient		6	2.47			
World Knowledge	Guess & Correct	Less Proficient	32	27.35	96	26.67
		More Proficient	64	26.34		
	Indicated "Known" & Correct	Less Proficient	32	13.17	64	17.78
		More Proficient	32	27.35		
	Guess & Wrong	Less Proficient	144	59.26	189	52.50
		More Proficient	45	38.46		
	Indicated "known" but Wrong	Less Proficient	8	6.84	11	3.06
More Proficient		3	1.23			

#### 4.2 EFL technical university learners' strategy use

Table 3 presents the mean score of each item in the vocabulary strategy questionnaire. Overall, the mean scores for each item in both groups were low, out of the full point 5. This reveals that the EFL technical university learners didn't make frequent use of strategies when inferring word meaning. As shown in Table 3, to solve word problems, most of them tended to use "slowing reading rate" (item 12, Mean=3.56) most, followed by prior knowledge (item 6, Mean=3.52), recognition of cognates (item 1, Mean=3.35), rereading the sentence (item 8, Mean=3.35), translate word for word (item 14, Mean=3.33), and skipping unimportant words

(item 20, Mean=3.23).

Further analysis of the strategy use in the more proficient group showed the mostly frequently used strategies are prior knowledge (items 6, Mean=3.90), recognition of cognates (item 1, Mean=3.59), rereading the sentence (item 8, Mean=3.59), and slowing reading rate (item 12, Mean=3.51). On the other hand, the less proficient group tended to slow reading rate (item 12, Mean=3.58), use prior knowledge (items 6, Mean=3.33), translate word for word (item 14, Mean=3.26), recognition of cognates (item 1, Mean=3.24), rereading the sentence (item 8, Mean=3.24), and continue reading (item 22, Mean=3.16).

Table 3. Mean Scores of Each Item in Vocabulary Strategy Questionnaire

Item	All	More Proficient	Less Proficient
1 recognition of cognates (i.e. appearance similarities)	3.35	3.59	3.26
2 syntactic clues	2.87	3.33	2.64
3 morphological analysis	2.90	3.03	2.83
4 part of speech	3.03	3.49	2.80
5 semantic clues	2.73	3.05	2.58
6 prior knowledge	3.52	3.90	3.33
7 visualizing the content	2.91	3.13	2.82
8 reread the sentences	3.35	3.60	3.26
9 generating questions	3.22	3.31	3.17
10 producing synonyms	2.83	3.31	2.59
11 read aloud	2.85	3.15	2.70
12 slow reading rate	3.56	3.51	3.58
13 self-directed dialogue	3.07	2.92	3.14
14 translate word by word	3.33	3.49	3.26
15 comment on guessing behavior	2.98	3.13	2.91
16 monitor comprehension	2.88	2.97	2.83
17 evaluate guessing	2.95	3.28	2.79
18 note errors	2.92	3.28	2.74
19 repair guessing	3.14	3.15	3.14
20 distinguish and skip unimportant words	3.23	3.44	3.14
21 detour to find another way	2.98	3.31	2.83
22 continue reading	3.18	3.21	3.16

A further analysis was to compare the differences in the strategy use across proficiency. As shown in Table 4, for both more and less proficient groups, there was no significant difference between the use of cognitive and metacognitive strategies to infer word meaning ( $p > .05$ ). This means that regardless of the L2 proficiency, the learners in this study did not use cognitive strategies more often than meta-cognitive strategies, and vice versa.

Table 4. The Comparisons between the Use of Cognitive Strategies and Metacognitive Strategies by Different Proficient Groups

Group	Strategy	M	SD	t-value	Significance
More Proficient	Cognitive	3.496	0.618	0.89	0.377
	Meta-Cognitive	3.375	0.520		
Less Proficient	Cognitive	2.910	0.591	-1.23	0.220
	Meta-Cognitive	3.014	0.508		

\* $p < 0.05$  \*\* $p < 0.01$

However, Table 5 shows that there was significant difference between the two different proficient groups in using cognitive and meta-cognitive strategies ( $p < .01$ ). That is, the more proficient group used more cognitive strategies as well as meta-cognitive strategies than

the less proficient group to infer word meanings when their comprehension broke down. For either the cognitive or meta-cognitive strategy, more proficient learners tended to use more strategies to infer word meaning than their less proficient counterparts.

*Table 5. The Comparisons between Different Proficient Groups in Using Cognitive Strategies and Metacognitive Strategies*

<i>Strategy</i>	<i>Group</i>	<i>M</i>	<i>SD</i>	<i>t-value</i>
Cognitive	More Proficient	3.496	0.618	4.78**
	Less Proficient	2.910	0.591	
Meta-Cognitive	More Proficient	3.375	0.520	3.48**
	Less Proficient	3.014	0.508	

\* $p < 0.05$  \*\* $p < 0.01$

## 5. Discussions

The results indicated that EFL Technical University learners' lexical inference ability was inadequate and most of them had difficulty in using world knowledge and morphological knowledge to infer the word meaning. In this study, most participants' failure in the inference task that required world knowledge and morphological knowledge might lie in the reason that they were weak in applying their knowledge sources, particularly in the two categories. This finding adds support to the previous studies conducted by De Bot et al. (1997) and Nassaji (2003). In other words, the students in this study lacked of the morphological knowledge, involving the internal structure of the words, such morphological features as prefixes, suffixes, inflections, roots, and general morphological derivatives. They also had difficulty in applying prior knowledge (i.e. extra-textual clues) to deriving word meaning as well.

While the findings in this study imply that world /prior knowledge and morphological knowledge might be associated with successful inference, it does not mean that unsuccessful inferencing depends solely on certain kind of knowledge source which was used. As shown in Table 2, none of the knowledge sources, in both the groups at different proficiency levels, was 100% alone. This suggests that unsuccessful inference may be attributed to lack of various kinds of knowledge sources and the EFL technical university learners need effectively combine various knowledge sources in an attempt to infer word meanings. This explanation is in line with De Bot et al's (1997) findings, indicating that successful inference depends upon various knowledge sources ranging from knowledge of grammar, morphology, phonology, and knowledge of the world, to knowledge of punctuation, word association, and cognates, etc.

The findings also revealed that the means of responses for each item were quite low, ranging from 3.56 to 2.58, as shown in Table 3. Irrespective of their reading proficiency levels, all the students used slowing reading rate (item 13, Mean=3.59) most frequently, followed by prior knowledge (item 6, Mean=3.52), recognition of cognates (item 1, Mean=3.35), rereading the sentence (item 9, Mean=3.35), translate word for word (item 15, Mean=3.33). However, the scattered means for all the items suggest that not all the students used all the strategies and that there was variations among the students in terms of types of strategies use, as indicated in Nassaji's study (2003). This finding might explain why they did not perform well in the lexical inference test, while using the strategies to infer word meaning. Another reason supported by Nassaji (2003) is that successful inference depends on the extent to which various kinds of knowledge sources and strategies coverage and link. In this study, although all the students reported their use of strategies to deal with the word problems, the insufficient knowledge sources impaired their success in guessing the word meaning.

Further analysis of the different strategies use indicated a slight discrepancy between the different proficiency groups. As shown in Table 3, the more proficient students made more frequent use of prior knowledge (item 6), cognate (item 1), and rereading the sentences (item 9), while the less proficient students tended to slow the reading rate (item 13), and translate word for word (item 15), in addition to examine the title and illustrations (item 6), as their top three favorite strategies. One factor that explains this difference might be the learners' low linguistic proficiency. As Nassaji (2006) indicated in his study, low proficient students tended to use more local-word-based strategies such as analysis, word repeating, and word form analogy.

However, it is inappropriate to conclude that the strategies the more efficient used are more efficient than those by the less proficient ones. As stated in Table 1, a majority of the participating students had low L2 proficiency and shared the similar educational background. The reasons might result in a similar pattern of difficulties in using knowledge sources and little discrepancy between strategy use, as shown in Table 3, Table 4 and Table 5. The similar pattern in using types of strategies might also lie in the factors suggested by Nassaji's (2006) that these similarities might be partly attributable to the homogeneity of the two groups with respect to their L1, educational background, and culture.

Although it should be cautious to interpret the efficiency of each strategy, the more proficient groups always showed higher percentage of correct inference than the less proficient groups (as shown in Table 2) and made more frequent use of the strategies in all the items than the less proficient counterparts (as shown in Table 5). The findings may support that the more proficient learners might be more apt to include the extra-textual cues (De Bot et al., 1997) and linguistic information in their attempt to infer word meaning (Morrison, 1996; Knodo-Brown, 2006). Thus, this finding is consistent with other previous studies (e.g. Bengeleil & Paribakht, 2004; Knodo-Brown, 2006; Morrison, 1996; Nassaji, 2006; Shen, 2005), suggesting that in EFL learning context, learner's proficiency might be an important factor when the instruction of lexical inference is considered. However, a further study is needed to examine the relationship between the participating students' inference ability and their strategy use.

## **6. Conclusion and Implications**

The study demonstrated that the EFL technical university learners' ability in lexical inference was low and they had difficulties in making effective use of some knowledge sources and strategies in inferring word meaning of unknown words. World knowledge and morphological knowledge were two main difficulties that might impair their lexical inference. Of the strategies, both groups used predominantly prior knowledge by examining the title and illustration, reread the sentence, recognition of word cognates, and slowing reading rate. Regardless of the type of strategy, the more proficient learners were more apt to use strategies than their less proficient counterparts.

The teachers in the technical universities should not expect an immediate result of instructional training when their students' L2 proficiency is limited. Instead, firstly, a systematic training with a robust lexical knowledge for L2 vocabulary development in both breadth and depth might help EFL technical university learners with successful lexical inference. Then, the instructional program should be context-based moving beyond the local clues to integrating other dimensions of linguistic and non-linguistic knowledge, such as morphological knowledge, grammatical knowledge, discourse knowledge, and world knowledge. When the instruction is given to those with low proficiency learners, the provided words should be "guessable" (Nation, 2001). Moreover, making the students aware of the taxonomy of knowledge sources and strategies and training them to effectively use

various sources may help to enhance their inference skill.

This study offers an important insight to EFL teachers for a better understanding of lexical inference. However, the results should be interpreted cautiously because the students' retrospective report on the use of strategies may have caused them to reveal those they may not have actually used, due to the quantitative nature of the research method. In an attempt to collect a more in-depth data, a think-aloud method should be conducted as a supplementary approach in the future research to examine the actual use of strategies. A further research is also needed to compare the diverse difficulties and strategies use across different types of reading passages.

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#### **APPENDIX I:**

Reading Passage: #Rental Blue by Carlos Gomez; *Selected from Open Book* (Lynne Gaetz, 2002), p.p. 25-26. Longman

##### ● **Sample of the Reading Passage:**

Last summer I turned 19 and I thought that life was great. I was about to enter university and I felt very adult [ 1 ] and independent. I decided to move out of my home and rent[ 2 ] an apartment. My best friend, Todd, went apartment hunting with me.

On our third day of apartment, we found what seemed like a great place on the top floor of an old house. ...Todd didn't have a job so I signed the lease[ 3]. There were two restrictions: no pets[4] and no

subletting [5]. ....

We moved in on September 1<sup>st</sup>. Very quickly, the problems began. .... Todd, on the other hand, was very easy-going and not particularly ambitious [6]. ....

Todd decided that the greatest thing about living away from his parents was the possibility of having parties any time.....They smoked and left cigarette butts in our bowls. I complained to Todd about the constant parties and he promised to reserve the partying for the weekend. One Saturday night in October, after a long shift [7] in the restaurant, I got home and the house was fairly quiet. ...."Todd is finally showing me some respect," I thought. I was exhausted and I just wanted to get some help. ....The next morning, Todd couldn't understand why I got so upset when I found a strange couple asleep in my bed. ...and he moved out. I didn't stop him and felt very relieved [8] when he left.

With Todd gone, I was one hundred percent responsible for the rent [9] and utilities. ....Then, the cockroaches invaded. One night I saw them scurry [10] under the fridge when I turned on the light.....

When I first complained to the landlord about the cockroaches, he laughed and said, "I told you no pets!" What a comedian. His wife's reaction was much nastier: "I have a very clean house. If there are insects, it is because you bought them here!"

Fortunately, the landlord took action. He told to go out for three days while he sprayed the apartment with insecticide [11]. When I moved back to the apartment, I got red rashes on my hands. I think I was allergic [12] to the insecticide. I wanted to leave and find another place. I.... Now, I regret the no "sublet" clause in my lease. Somehow I made it through .....

## APPENDIX II: Vocabulary Strategies for Unknown Words

5. ALWAYS
4. FREQUENTLY
3. SOMETIMES
2. RARELY
1. NEVER

### Part One: Guessing Strategies by Using Context Clues

1. I try to relate the unknown word by its word form (i.e. appearance similarity) to another word I previously learned and generate a hypothesis on the word meaning.
2. I guess word meaning from context utilizing syntactic cues (i.e. the relationship between sentences and clauses, and the additional meaning given in the sentence).
3. I guess word meaning from context utilizing morphological analysis (i.e. prefix, suffix).
4. I guess word meaning by considering the part of speech of the unknown word.
5. I guess word meaning from context utilizing semantic cues (i.e. synonyms, restatement, comparison and contrast).
6. I guess word meaning from prior knowledge by examining the title or illustrations.

### Part Two: Monitoring and Repairing Strategies

7. When appropriate, I try to visualize the content in an attempt to guess the meaning of the unknown words.
8. While I guess the word meaning, I reread the sentence including the unknown word.
9. While I am reading, I generate questions about the words I don't understand.
10. While I am reading, I try to produce synonyms to substitute for the unknown word in an attempt to guess the word meaning.
11. When I think I can not comprehend the unknown word, I read it aloud in an attempt to make a sound link.
12. When I find the unknown word, I slow my reading rate in an attempt to comprehend the word meaning.
13. When reading, I ask myself questions about the word and its surrounding words and have a self-directed dialogue (i.e. talking to myself).
14. While reading, I translate word for word in an attempt to guess the word meaning.
15. As I read along, I comment on my behavior or guessing process.
16. As I read along, I monitor my comprehension of the word meaning.
17. After I determine the word meaning, I evaluate whether what I guess contributes to my understanding of the text.
18. As I read along, I note errors in my guessing process.
19. As I note errors, I recover word meaning through repair to make it more appropriate to comprehending the text.
20. While reading, I distinguish between words that are unimportant and those that seem critical to the meaning of the text. I skip the unimportant words.

21. When I find I cannot guess the unknown word, I detour it and try another skill.
22. I continue reading if I find I cannot successfully decode a word.