SEGMENTATION OF TERTIARY NON-NATIVE ENGLISH SPEAKING STUDENTS' LANGUAGE LEARNING STRATEGIES

Darrin Thomas*

Abstract

The purpose of this study was to segment a sample from a population of non-native English speaking university students into several distinct clusters based on the six dimensions of the Strategy Inventory of Language Learning. Results indicated four clusters (Strategic, Moderate, Low, & Unstrategic) based on the respondents' tendencies to use various strategies. Furthermore, there were no differences found by gender or class level. However, a difference was found based on major with Business and Education majors being significantly more likely to be in the Unstrategic cluster than the Strategic cluster. The implication of this is that non-English majors need additional support in developing language-learning skills.

Keywords: Learning strategies, EFL, university, kmeans

INTRODUCTION

The reach of English today has almost staggering proportions in terms of the number of users and its economic impact. Approximately 700 million people speak English as a second language, representing 10% of the population of the planet (English Language, 2016). Of all the data stored on computers, 80% of this information is stored in English (English Language, 2016). The economic impact is also apparent in the fact that English speaking bilingual workers make 5-20% more than workers who only speak a single language (Huffington Post, 2013).

Within Southeast Asia, English education has struggled with the exception of the Philippines (Hunt, 2014). Despite this, English has become the de facto lingua franca of the Association of Southeast Asian Nations (ASEAN) (Kirkpatrick, 2010). This has placed pressure on almost all ASEAN member nations to search for ways to improve English education in their respective countries.

*Dr. Darrin Thomas obtained a Ph.D. in Education from Adventist International Institute of Advanced Studies located in the Philippines. Currently he is working as a Lecturer in the department of English at Asia-Pacific International University.

In Thailand, the promotion of an English-mediated environment by the ASEAN community has led to concerns for Thais who often have weaker English language skills (Fredrickson, 2016). Worldwide, Thais have ranked near the bottom in English ability consistently for the past decade (Education First, 2016). In general, communication in English is a challenge for university students in Thailand (Rajprasit, Pratoomrat, & Wang, 2015). Combining this with the increase in international students who are also learning English in Thailand, indicates a need to examine the English speaking skills of students at the tertiary level.

Learning strategies have been studied extensively in many academic subjects such as math, science and even in social studies (Berger & Karabenick, 2011; Ebrahim, 2012; Vaughn & Amosun, 2016). In addition, learning strategies in the field of language acquisition have been thoroughly studied as well (Lee & Oxford, 2008; Oxford, 2013). However, most studies look at how learning strategies relate to other variables such as motivation, gender, class level, and or socio-economic status (Chen, 2009; Khamkhien, 2010; Rao & Liu, 2011; Tam, 2013; Yaping, 2010). Few studies have looked at how the respondents of the study relate to one another. In other words, few studies have attempted to cull segments from a sample to see what learning strategy characteristics, participants share.

Understanding how different groups, rather than just individuals, use learning strategies, can allow teachers and schools to reach larger portions of the non-native English speaking population with appropriate ESL/EFL techniques to support whole groups of students. Therefore, the purpose of this study is to identify sub-populations of non-native English speaking tertiary students, based on the learning strategies they employ.

Learning Strategies

Learning strategies are specific ways or methods to accomplish a task or manipulate knowledge (Brown & Lee, 2015). Strategies of learning can be highly diverse from person to person. Oxford (1990) identified two categories of learning strategies, which included a total of six types of learning strategies. Strategies of learning can be either direct or indirect. The difference between direct and indirect is in the way in which the strategy affects language learning. Direct strategies are memory-related, cognitive, and compensatory. Indirect strategies are metacognitive, affective, and social strategies.

Memory-related strategies are ways that students recall and store information (Oxford, 2013). Specific strategies may include the use of mnemonics, repetition, and chunking (Narang, Priya, & Chaudhry, 2016). However, students who reject rote-learning strategies have superior English usage performance and a larger vocabulary than students who focus on rote learning (Fewell, 2010; Nacera, 2010). Memory-related strategies can be viewed as the skills associated with the lowest level on Bloom's Taxonomy named "Remembering."

Cognitive strategies are the manipulation of language information in a way that is consistent with the mid-levels of Bloom's Taxonomy (Oxford, 2013). This involves such skills as summarizing, applying, synthesizing, and or judging. Among ESL students, the use of cognitive strategies was found to be the strongest predictor of GPA (Radwan, 2011). Examples of cognitive strategies include

problem-solving and elaboration (Borich, 2011).

Compensatory strategies involve ways of dealing with weaknesses related to learning and or missing information (Lee & Oxford, 2008). An example of a compensatory strategy would be using context clues to determine the meaning of an unknown word. One study found compensatory strategies to be the only factor to predict English ability (Magno, 2010). Furthermore, students with larger vocabularies use compensatory strategies more frequently than students with smaller vocabularies (Nacera, 2010).

Indirect strategies include metacognitive, affective, and social strategies. Metacognitive strategies are ways in which students plan and evaluate their learning. Examples of metacognitive strategies include setting goals and comprehension monitoring (Oakhill, Cain, & McCarthy, 2015). Successful use of metacognitive strategies requires basic declarative knowledge, an understanding of what procedural steps to take to accomplish the task as well as the ability to assess progress (Schunk, 2012). Metacognitive strategies are one of the most popular strategies to use among ESL/EFL students (Nacera, 2010; Radwan, 2011).

Affective strategies are strategies students use to control their emotions (Lee & Oxford, 2008). Examples include trying to relax, or talking to others about one's feelings when learning English (Brown & Lee, 2015). Several studies have found that emotions, such as boredom, enjoyment, and pride, can influence academic performance (Pekrun, Goetz, Daniels, Stupinsky, & Perry, 2010; Pekrun, Hall, Goetz, & Perry, 2014; Villavicencio & Bernardo, 2013). In the context of L2 acquisition, the role of emotions is not as thoroughly researched (MacIntyre & Gregersen, 2012; Swain, 2011). However, one study found that students who enjoy learning English are more effective at learning the language (Wong & Nunan, 2011). In addition, affective strategies were found to be the least popular strategy employed by language students (Nacera, 2010). This may indicate deficiencies in employing this skill or perhaps an indifference to the use of it.

Social strategies are skills used in working with others to acquire a language (Oxford, 2013). Examples include practicing English with others and asking help from other English speakers (Brown & Lee, 2015). Such strategies are consistent with social constructivism, which emphasizes how individuals learn in groups (Kolb, 2015). Furthermore, social strategies have been a major focus of language teaching through the approach of Communicative Language Teaching and its focus on an interactional approach to language learning (Richards & Rodgers, 2015).

Oxford's (1990) model is not without criticism. For example, the use of a questionnaire has been considered suspect, some of the items are considered unclear, and the survey focuses on attitudes towards certain strategies rather than the actual use of strategies (Wray & Hajar, 2015). Despite the weaknesses, Oxford's (1990) model is one of the most extensively used measures of learning strategies and has been shown to be highly reliable and valid in many contexts (Nisbet, Tindall, & Arroyo, 2015).

Demographic Factors

Gender, class level, major, and income have all been found to have influence on the

learning strategies students employ to learn a language. For gender, females use more strategies overall than males, but males use social strategies in particular, more often than females (Radwan, 2011; Yaping, 2010). However, there is not a consensus in terms of there being a difference in learning strategies used based on gender (Viriya & Sapsirin, 2014; Zarei, 2013).

For class level, Chen (2009) found a difference in terms of which learning strategies are used by k-12 students. At the tertiary level, students use more social and affective strategies when compared to K-12 students (Chen, 2014; Sepasdar & Soori, 2014). Lastly, differences by major have been found between social science and hard science majors (Rao & Liu, 2011).

English in Thailand

In 2001, the Ministry of Education introduced national foreign language standards and benchmarks in Thailand (Khamkhien, 2010). This led to all students from Kindergarten through university to have exposure to English (Khamkhien, 2010). The pervading teaching style in most parts of Thailand is lecture-style or direct instruction that employs grammar-translation with a structural approach, despite efforts to encourage communicative language teaching (Foster, Fan, & Le, 2015). This is the teaching experience of many students in Thailand whether they are Thais or internationals studying in the country.

Students focus heavily on memory-related strategies followed by metacognitive ones (Suwanarak, 2012). Vibulphol (2016) found that Thai students are motivated to learn English but that the actual learning does not translate beyond the classroom. Given the EFL context, using the L2 outside the classroom has always been a challenge. This further calls for changes to teaching in order to improve relevance and to compensate for the lack of English speaking opportunities outside of class (Brown & Lee, 2015).

Research Questions

The following questions were developed based on the literature review.

I. What are the perceptions of the respondents in terms of Oxford's six dimensions of language learning strategies?

II. What are the subcategories of the sample of tertiary non-native English speaking students based on Oxford's six dimensions of language learning strategies?

III. What is the demographic profile of the subcategories of the sample of tertiary non-native English speaking students based on Oxford's six dimensions of language learning strategies?

IV. What is the relationship between the subcategories and the demographic variables of the study?

There is little information on subgroups within a sample of a population in terms of the use of learning strategies pertaining to English acquisition. Therefore, investigating the distinct characteristics of not just an entire sample but subgroups within a sample is needed.

METHODOLOGY

Population and Sample

The population of this study is tertiary non-native English speaking students. The sample was derived using stratified sampling based

on gender in order to nullify the disagreement in the literature over the role of gender in the use of learning strategies (Radawin, 2011; Yaping, 2010; Zarei, 2013). Stratified sampling reduces the variability in any subgroups when compared to the population and enhances statistical precision (Aday & Cornelius, 2006). The sample was taken from an international university located in Thailand with a total number of 301 respondents. In terms of gender, the majority of respondents were female. English majors made up the majority of the respondents followed by a large group of Business and Education majors. Lastly, when examining the class level, the sample was balanced among the four levels. Table 1 provides the demographic profile of the sample.

Research Design & Instruments

A cross-sectional survey design was employed in this study. The researcher collected data at the university. The survey consisted of two sections. Section 1 included demographic variables such as gender, class level, and major. Section 2 is comprised of Oxford's (1990) six dimensions of language learning strategies.

The Strategy Inventory for Language Learning (SILL) is made up of 50 Likert-type statements, measuring students' perceptions of the learning strategies (memory-related, cognitive, compensatory, metacognitive, affective, and social) they use to develop their English ability. This scale was selected because it provides a valid measurement of many learning strategies (Brown & Lee, 2015).

Each statement in the SILL was measured using a 5-point Likert-scale with 1 = Never or almost never true of me, 2 = Usually not true of me, 3 = Somewhat true of me, 4 = Usually true of me, 5 = Always or almost always true of me. Sample statements include for memory strategies "I use rhymes to remember new English words", cognitive strategies "I practice the sounds of English", compensatory strategies "I read English without looking up every new word", metacognitive strategies "I pay attention when someone is speaking English", social strategies "I ask questions in English", and affective strategies "I try to relax whenever I feel afraid of using English."

Data Analysis

Descriptive statistics were analyzed in this study to assess the perceptions of the participants in relation to learning strategies. The means for the variables as well as for

Table 1: Demographic profile

Gender	Male	Female			
	38%	58%			
Class Level	Freshman	Sophomore	Junior	Senior	
	22%	26%	21%	28%	
Major	Business	Education	English	Religion	Science
	14%	21%	48%	6%	3%

individual survey items were calculated from the observed data. An ANOVA was conducted to determine differences based on demographics. K-means clustering was used to segment the sample into subgroups, based on their use of the various learning strategies. A Chi-square test of proportions was conducted to compare the proportions of the subgroups to the sample. Lastly, multinomial regression was employed to determine the relationship between the clusters that were developed, and the demographic variables of this study.

RESULTS

The means across the six types of learning strategies ranged from 3.19 to almost 3.6, which indicates that the respondents believe that the statements of their use of various learning strategies were somewhat true. Table 2 provides a summary of the means by learning strategy.

An analysis of variance was conducted on the six dimensions. There was no difference when comparisons were made by class, gender, or major for memory, cognitive, and compensatory strategies. In addition, no difference was found for metacognitive, affective, and social strategies when comparisons were made by class and gender. However, differences were found when comparisons were made by major for metacognitive, affective, and social learning strategies.

Analysis of variance showed a statistically significant difference at the $p < .05$ level for metacognitive strategies by major: $F(5, 280) = 3.65$, $p < .05$. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for English majors ($M = 3.60$, $SD = .59$) was significantly different from Business majors ($M = 3.26$, $SD = .77$). The Cohen's d was .5 indicating a medium effect size.

Analysis of variance showed a statistically significant difference at the $p < .05$ level for affective strategies by major: $F(5, 283) = 3.27$, $p < .05$. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for English majors ($M = 3.37$, $SD = .66$) was significantly different from Business majors ($M = 2.75$, SD = .78) and Education majors ($M = 3.04$, $SD = .75$). The Cohen's d was .85 indicating a large effect size for English and Business and it was .47 for English and Education, which is a medium effect size. In addition, Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Religion majors (M = 3.36, $SD = .63$) was significantly different from Business majors ($M = 2.75$, $SD = .78$). The Cohen's d was .86 indicating a large effect size.

Table 2: Learning strategy means

Learning Strategy	M	95% CI	SD
Memory	3.19	3.12 – 3.26	.59
Cognitive	3.51	3.44 – 3.57	.53
Compensatory	3.41	3.34 – 3.49	.60
Metacognitive	3.56	3.48 – 3.63	.62
Affective	3.20	3.12 – 3.29	.75
Social	3.54	3.45 – 3.63	.75

Analysis of variance showed a statistically significant difference at the $p < .05$ level for social strategies by major: $F(5, 291) = 3.14$, $p < .05$. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for English majors ($M = 3.63$, $SD = .68$) was significantly different from Education majors ($M = 3.30$, $SD = .83$). The Cohen's d was .45 indicating a medium effect size.

A k-means clustering analysis was conducted in order to segment the sample of the study based on the six dimensions of Oxford's learning strategies. The number of clusters was determined using the elbow method. The results indicated that four clusters were appropriate. Cluster 4 ($n = 58$) showed the highest mean for all six dimensions, as such this cluster is the highly strategic non-native English speaking learners. Cluster 3 ($n = 117$) had the second highest means for all six dimensions and was named the moderately strategic non-native English speaking learners. Cluster 1 ($n = 90$) followed with the third highest mean in all six dimensions and was characterized as the low strategic non-native English speaking learners. Lastly, cluster 2 ($n = 36$) had the lowest means in all six dimensions and was named the Unstrategic non-native English speaking learners. Table 3 shows the cluster sizes and means for each cluster by the six dimensions.

A chi-square test of proportion was conducted comparing the demographic profile of the clusters to the sample as a way to confirm if the profiles of the clusters are distinct from the sample. K-means analysis cannot account for discrete variables in its analysis so the chi-square test of proportion helps to see if there are differences in the clusters beyond just the means of the six dimensions.

The Highly Strategic Cluster (cluster 4) had similar proportions to the sample (see Table 1) for gender, class level, and major. The Moderately Strategic cluster (cluster 3) had similar proportions to the sample for gender, class level, and major. The Low Strategic Cluster (cluster 1) also had similar proportions to the sample for gender, class level, and major. However, the Unstrategic Cluster (cluster 2), although it was balanced at the class level, it was primarily male (58%, $x^2 = 5.48, p < .05$) with fewer females present (39%, $x^2 = 4.64$, $p < .05$) and was thus disproportionate when compared by gender to the sample. The proportion of Business (28%, $x^2 = 4.59$, $p < .05$) and Education (36%, $x^2 = 4.08$, $p < .05$) majors was higher than the sample while the representation of English majors (25%, $x^2 = 6.73$, $p < .05$) below the proportions of the sample. Table 4 summarizes these results.

Table 3: Cluster name and means

Cluster Name	Size	Memory	Cognitive	Compensatory	Metacognative	Affective	Social
1 Low strategic	90	3.07	3.41	3.39	3.32	2.78	3.18
2 Unstrategic	36	2.44	2.78	2.63	2.74	2.16	2.29
3 Moderately strategic	117	3.25	3.56	3.40	3.62	3.46	3.81
4 Highly Strategic	58	3.74	3.98	3.96	4.21	3.96	4.31

Table 4: Proportion of clusters

	Strategic	Moderate	Low	Unstrategic
Gender				
Females	67%	60%	57%	39%*
Males	31%	36%	36%	58%*
Class Level				
Freshmen	22%	22%	19%	25%
Sophomores	31%	30%	22%	14%
Juniors	25%	18%	21%	25%
Seniors	19%	26%	34%	33%
Major				
Business	7%	10%	18%	28%*
Education	14%	11%	21%	36%*
English	55%	53%	47%	25%*
Religion	7%	9%	2%	6%
Science	3%	1%	4%	3%

* Significantly different from the sample proportions at the $p < 0.05$ level

A multinomial logistic regression was conducted to determine the odds of a respondent being in one of the four Clusters of strategic learners when controlling for class level, gender, and major. Results indicated that Class level and gender are not statistically significant. However, major is a statistically significant predictor of strategic learners when gender and class level are controlled for in the model. If a respondent was a Business major, they were 97% less likely to be in the Strategic Cluster than the Unstrategic Cluster. In addition, if a respondent was an Education major they were also 97% less likely to be in the Strategic Cluster than the Unstrategic Cluster. Other combinations were not significant such as when considering the Religion major, English major, or the Science major. Table 5 provides the multinomial logistic regression results.

Table 5: Multinomial regression results

	Strategic			Moderate			Low		
Predictor	*B*	*SE B*	e^B	*B*	*SE B*	e^B	*B*	*SE B*	e^B
Major									
Business	-3.39*	1.42	.03	-1.96	.27	.13	-1.53	1.35	.21
Education	-3.36*	1.36	.03	-1.87	.11	.15	-1.88	1.28	.16
English	-1.29	1.36	.27	-.24	.18	.78	-.55	1.35	.58
Religion	1.92	1.58	.14	-.53	.02	.59	-1.93	1.64	.15
Science	.10	1.79	.18	-2.21	.02	.11	-.57	1.71	.56
Constant	1.81			1.41			1.41		
AIC	800.64								

Note: Controls are gender, and class level (omitted from the table). e^B = exponentiated *B*. Unstrategic Learners is the reference category. $*p < .05$.

DISCUSSION

The results of this study indicate several important findings. Firstly, there was no difference when comparisons where made by gender. This is in contrast to the works of Radwan (2011) and Yaping (2010) who found a difference, in that females used more strategies overall and that men used more social strategies. Rather, the results of this study agree with Viriya and Sapsirin (2014) and Zarei (2013), in that there may be no difference in learning strategies based on gender.

The lack of difference in the use of language strategies by gender may be culturally dependent. Radwan's (2011) study, which found a difference by gender, was conducted in Oman. Yaping's (2010) study, which also found a difference by gender, was conducted among Chinese high school students. Viriya and Sapisirin (2014) study was conducted in Thailand and Zarei's (2013) study was conducted in Iran and both of these studies did not find a difference by gender. Therefore, the differences among these studies and the controversy over gender in the use of language learning strategies points to a factor that is not being controlled for, such as culture.

Secondly, there were also no differences found when comparisons were made by class level. This is not in agreement with Chen (2009 & 2014). However, Chen's work focused on the K-12 level while this study was focused on the tertiary level. In spite of this, it would seem reasonable that as students progress through their university studies they would begin to use more and more language learning strategies due to their increased experience (Brown & Lee, 2015). Yet in this study, there is no support for this conclusion.

Thirdly, there were differences by major for affective, metacognitive, and social strategies. Generally, English majors were outperforming Business and Education majors. Since an English major is focused on learning English, it seems reasonable that they would have superior tendencies for language learning strategies when compared to other majors. Rao and Liu (2011) found differences between social science and hard science majors. However, this study was focused primarily on social science majors. As such, the inclusion of hard science majors may have found this distinction but it was not a part of the objectives of the study.

The fourth finding comes from the results of the k-means clustering, which revealed four unique clusters. What was unique about these four clusters was that they could be ranked strictly by how much the respondents indicated the statements were true for them. What this means is that the Highly Strategic Cluster was always the most strategic, while the Unstrategic cluster was always the least strategic for all six dimensions. This implies that stronger students are usually strong across the board while weak students are weak across the board when it comes to the use of language learning strategies.

The fifth observation is that males were over-represented in the Unstrategic Cluster. This may mean that in general there is no difference by gender as found in this study and in the work of Radwan (2011) and Yaping (2010). However, when looking at differences shaded by overall performance one is likely to find a surplus of males at the bottom. The purpose of this study was to look deeper than the overall sample and find what was happening at the subgroup level. As such, when everyone is placed in a single group there

is no difference by gender in the use of learning strategies. However, dividing the sample into clusters revealed gender as a factor to consider. Other studies did not consider this and this may partially explain the controversy over gender and language learning strategies (Radwan, 2011; Viriya & Sapsirin, 2014; Yaping, 2010; Zarei, 2013).

The final finding indicates that major is an important variable after the clusters were developed. English majors were underrepresented in the Unstrategic Cluster while Business and Education majors were over-represented. In addition, non-English majors are much more likely to be in the Unstrategic Cluster than the Highly Strategic Cluster. One potential reason for such results was already mentioned in that English majors are focused on learning language in university while other majors learn English as an additional requirement, on top of their goal of acquiring the skills consistent with their discipline. Furthermore, the difference in the use of learning strategies may also be a reflection of personality as one study found that different personalities select different majors (Vedel, 2016).

RECOMMENDATIONS

Based on these results the following recommendations have been made. Firstly, with respect to non-English majors from populations consisting primarily of non-native English speaking students, these students will need additional support in terms of developing language learning strategies. This can be achieved by raising awareness of language teaching concepts among the faculties that are not teaching in the English program. For example, support in learning how to teach with Content-Based instruction, Task-Based Instruction, and or Text-Based Instruction can all be used in a non-English major context (Richards & Rodgers, 2015). All of these methods can be modified easily to focus on knowledge from a particular discipline, with an undercurrent of language support. The general learning strategies acquired through the study of content within the discipline, may support students in developing their language learning skills as well.

Secondly, in general, males need additional support as they are over represented as Unstrategic learners. As such, a school would need to support specifically males, using the strategies mentioned for supporting non-English majors. Females normally outperformed males in terms of language acquisition (van der Slik, van Hout, & Schepens, 2015). Therefore, the primary goal for supporting males is not to completely remove their representation from the Unstrategic Cluster but to have it in proportion with their representation within the population.

For further study, the exploration of additional demographic variables would help to develop additional insights into the clusters. Potential variables would include income, country of origin, and or more majors. There is also a need to look at ways to assess further gender differences in language learning strategies. Lastly, using the results of this study to predict the cluster a student belongs to, would be especially useful to identify struggling students.

CONCLUSIONS

K-means clustering is a highly subjective form of statistical analysis. It is left to the researcher to determine the number of clusters.

As such, replication of the results would be difficult despite the insights that can be gained from such an analysis.

Students need to become strategic in their learning in order to acquire any skill and not just English. Understanding how a student uses or does not use learning strategies can allow teachers to provide suitable interventions. In addition, the insights of this study can help students to understand how they learn.

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