Nursing Students' Medical Terminology Learning Strategies

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ABSTRACT: *This study is concerned with the learning of medical terminology by nursing students at the Northern College of Nursing in the Kingdom of Saudi Arabia. It aims to investigate the use of learning strategies in relation to medical vocabulary use. The subjects under study included Four college nursing majors at Northern College of Nursing. Participants' mid-term scores and medical terminology learning strategy questionnaire were used to inquire students' use of learning strategies. The results of this study indicated that students in general prefer to use written repetition, verbal repetition, bilingual dictionary strategies. In addition, the students most proficient in medical terminology used various kinds of strategies more often than the less proficient students. Implications of these and other findings are discussed and suggestions are made regarding the teaching of strategies of learning medical terms in medical terminology courses.*

INTRODUCTION

This research provides a research-based guide for practice of learning medical terminology for nursing students, improving and promoting their understanding of medical vocabulary deeply an accurately. With employment in nursing booming, medical terms tailored for the nursing students is in high demand. Medical Vocabulary instruction is critical in the nursing because nurses, current and aspiring, need to communicate persuasively with patients, peers, doctors, and others.

Of interest for the present study is the learning of medical terminology to nursing students at Northern College of Nursing in Saudi Arabia. With particularly interested in students' strategy use in the learning of medical terminology. Medical language is the language employed by doctors and nurses in writing medical records and communicating with each other. Doctors need to learn to read and write medical terminology to complete hospital admission notes, diagnoses, and orders, which, later on, nurses must read and follow in order to carry out nursing interventions and take care of their patients. For these medical and nursing professionals, their first step to access medical language is to learn medical vocabulary.

In Saudi Arabia, nursing students are required to take the course "Medical Terminology" to meet the demands of their future jobs. In so far as the researcher knows, the nursing students of the Northern College of Nursing college where the researcher is teaching have to take Medical Terminology courses from their second to Fourth years. Every semester, more than one third of nursing students fail their Medical Terminology courses. In order to help teachers to overcome the challenge of teaching medical terminology and help nursing students at Northern College of Nursing learn medical terminology more effectively and efficiently, the researcher is motivated to explore the learning of medical terminology.

In point of view of Gylys and Wedding (1983:53), medical terminology is a specific terminology which is used to achieve the purpose of communication in the health care field efficiently and precisely, such as in writing diagnoses and nurses' notes. Basically, medical terminology has two characteristics. First, except for the one-syllable words, most medical words are made up roots and affixes. The affixes can be classified into prefix and suffix. Any single medical term has at least one root determining its meaning and one or more prefixes or suffixes to modify the meaning or part of the meaning. Teachers generally use this specific word formation to help students deal with these words. But, recognizing the word parts used to build medical terms still seems to be a major obstacle to nursing students' learning medical terms. Moreover, using word parts occasionally has pitfalls in guessing word meaning from context. Schmitt (2000: 44) warned when nursing students use word parts as an initial word-guessing strategy, they must be careful to check the surrounding context to see if their guess makes sense. Haynes and Baker (1993:55) also found that nursing students sometimes made an incorrect guess about what an unknown word meant in a given text and then stuck with that erroneous meaning in other textual contexts even though the surrounding context made clear it made no sense.

Moreover, medical vocabulary is an open system with a large number of low-frequency words and newly created words. Teaching and learning all the words seem an impossible task. Hence, teaching vocabulary learning strategies for inferring word meanings is more efficient than teaching every vocabulary item encountered. As Nation (1994:63) suggested teaching nursing students' strategies of learning the medical terms is especially important when it comes to dealing with low frequency words. Indeed, following Nation, Schmitt (2000:50) also suggested that high-frequency words should probably be taught, whereas learning low-frequency words will require strategies for determining their meaning.

Could nursing students use suitable learning strategies based on the characteristics of medical words, such as guessing from context and using word parts when learning medical words? Chamot and Kupper (1989: 73) indicated that high proficiency language learners know how to use appropriate strategies to reach their learning goals. Oxford (1985) asserted that successful students use a wide range of strategies which are appropriate for their learning tasks. Do high proficiency nursing students use different strategy patterns from those used by low proficiency students as revealed by the above-mentioned studies? To get more insights on the use of learning strategies of successful nursing students, the strategy patterns used by successful and unsuccessful students are also the focus of attention in the present study.

Research Questions

The main objective of this study is to explore the learning of medical terminology by Saudis nursing students. It focuses on the frequency of strategy use by nursing students when learning medical terminology and identifies the strategies related to success or failure in learning such terminology.

This study attempts to seek answers to the following research questions:
What are the strategies used most and least frequently by the students in the study?
2. Which strategies are used most often by the students who are the most proficient in medical terminology?
3. Does the overall medical terminology learning strategy use vary across different proficiency levels?
4. Does the use of six categories of medical terminology learning strategy vary across different proficiency levels?

LITERATURE REVIEW

In order to get more insights on the study of medical word learning strategies, this section will first review two recent studies of L2 vocabulary learning strategies and then studies of individual medical terminology strategies.Fan (2003) surveyed a sample of 1067 students at seven institutes in Hong Kong to examine the relationship among frequency of use, perceived usefulness, and actual usefulness of L2 vocabulary learning strategies. The findings of Fan's study indicated that the students used the strategies for reviewing and consolidating their knowledge of known words and perceived them as useful, and that they had a preference for dictionary strategies. The most proficient students depended much more on sources, guessing, dictionary, and known words strategies than the less proficient students. Regarding the discrepancies between frequency of use and perceived usefulness in learning L2 vocabulary, the findings revealed the complexity involved in strategy use. For example, even though students reported using more guessing strategies, they did not perceive these strategies as useful. In contrast, though the students seldom used management strategies, they thought these strategies were useful.

Schmitt (1997) conducted a large-scale study in Japan to assess which vocabulary learning strategies the students actually used and how helpful they believed them to be. Schmitt found that the students used more repetition and dictionary strategies and considered them more useful than other strategies. Semantic grouping and imagery strategies were less used and regarded the least useful. There was also some evidence that more advanced students tended to use more complex and meaning-focus strategies than less advanced students. Whether these findings are supported by the learning of technical terminology in the fields of English for Specific Purposes (ESP) and English for Nursing Purposes (ENP) needs to be further explored in related research. This is exactly what the current study is going to do.

A number of studies have sought to examine the effectiveness of some specific strategies for learning medical terminology (Fang, 1985; Troutt, 1987; Dunkle, 1983). Two studies that are

52

relevant to the current study will be reviewed here.A study by Fang (1985) investigated the success of two medical terminology learning strategies: (1) the analysis of affixes and roots and (2) finding the relationship between sound and script. The strategy 'to analyze affixes and roots' engages students to analyze word structures. For example: to learn the medical term 'endocarditis', internal inflammation of the heart, students must learn to analyze it into endo- (prefix, within), card (root, heart), and -itis (suffix, inflammation). On the other hand, the strategy 'finding the relationship between sound and script' involves attempts to find the relationships between pronunciation and spelling of medical words. Fang's study has provided some initial evidence to suggest that the use of analyzing affixes and roots promotes more medical terminology learning than the method of finding the relationship between sound and script.

Troutt (1987) investigated how method of teaching for nursing students, keyword versus traditional, was related to acquisition and retention of medical terminology in a classroom setting and in individualized learning. Five intact classes containing a total of 120 nursing students were taught three lessons of medical terminology by one or more of three methods: traditional, keyword in a classroom and keyword in individualized learning. The results indicated that the class taught using a keyword strategy retained significantly more words than the class taught by a traditional method for initial acquisition of medical terminology. However, there was no significant difference between traditional and keyword methods for long-term range retention of medical words at four and eight weeks. No difference was found in medical word scores between a keyword/classroom method versus a keyword/individualized method for either acquisition or retention. This study provided empirical evidence regarding the effectiveness of keyword methodology for initial acquisition of medical terminology.

Both Fang and Troutt focused on the effectiveness of two strategies. However, two learning strategies alone are not enough for us to get the whole picture of how nursing students learn medical terms more effectively. In order to gain an overall picture of the optimal use of learning strategies for medical terminology learning, a study that deals with all strategy groups would be a complement to Fang's and Troutt's research.

METHODOLOGY

Subjects
Two intact second-year classes at one Northern college of Nursing were recruited as the subjects of the study. The two classes were composed of 55 students in total. They were selected because they were available at the time the research was conducted. These subjects were female nursing majors. Medical terminology is a required subject in this fourth-year nursing college from the second to fourth years, so all participants were taking a Medical Terminology course.

Instruments
The test for evaluating the subjects' proficiency level in the current study was the Medical Terminology mid-term exam made by English teachers in the college. This is a curriculum-specific achievement test, rather than a general proficiency test. There were 50 questions in total in the test.

53

The test included matches, completing the medical words on the basis of their English definitions and filling in the meanings for prefixes, word roots and suffixes.

The instrument employed for collecting data on strategy use is the medical terminology learning strategies questionnaire developed by the researcher (see Appendix B). The categories of learning strategies were based on Schmitt's (1997) taxonomy for studying vocabulary strategies. Subjects were required to answer questions on their strategy use on a five-point Likert scale ranging from 1 ("never or almost never true of me") to 5 ("always or almost always true of me.") The questionnaire was made of two sections. Section one contained five questions, the purpose of which was to collect such background information as subjects' English proficiency and their medical vocabulary learning experience. Section two included 42 items grouped into six categories of medical terminology learning strategies:

First: Discovery strategies
1. Determination strategies for discovering new word meanings by guessing and using reference materials.
2. Social strategies for discovering new word meanings by asking someone who knows.

Second: Consolidation strategies
1. Social strategies for learning and practicing vocabulary, such as cooperative group and native speaker interaction.
2. Memory strategies, such as grouping, imagery, rhyming, moving physically, and reviewing in a structured way.
3. Cognitive strategies, such as repetition and using mechanical means to study medical terminology.
4. Metacognitive strategies for controlling and evaluating one's own learning, searching for practice opportunities and planning for learning tasks.
The questionnaire was tested and revised following a pilot study with 48 nursing students similar to the participants in the study.

Survey Procedure
All data were collected after the midterm week of the 2022 winter semester. Before commencing with the task, a brief explanation of the purpose of the study was provided. Subjects were advised that responses would not affect academic grades. Subjects were also told that they have to answer in terms of how well the statement of each item describes them. The answered questionnaires were collected right after the subjects completed them.

Data Analysis
In order to identify the most and least used strategies, the average mean score for each of the 42 strategies was calculated and rank ordered. Significant variation in mean strategy use in the six strategy categories (the dependent variables) as related to the independent variable (proficiency) was determined using a one-way analysis variance (ANOVA). A standard post hoc test, the Scheffe, was employed to determine where specific significant differences lay. The probability

level of significance for one-way ANOVA is set at .05. In order to identify the most and least used strategies, the average mean score for each of the 42 strategies was calculated and rank ordered. After the statistical procedures, the relevant discussion based on the three research questions is presented.

Each subject's responses to the medical terminology test were given scores. A correct answer is assigned 2 points and an incorrect answer is given no points. The total possible points were 100. Based on the test scores, subjects were grouped into three proficiency levels. The high-level group refers to those who score higher than 80, and the low-level group refers to those who score lower than 60. Those who score between 80 and 60 belong to the intermediate-level group. Consequently, 36 subjects were defined as high-level students, 28 intermediate-level ones and 25 low-level ones.

RESULTS

Table 1: Most used and least used strategies by all subjects

Item	Rank	Category	Strategy	Mean
29	1	Cognitive	Written repetition	4.34
28	2	Cognitive	Verbal repetition	4.02
5	3	Determination	Bilingual dictionary	3.84
33	4	Cognitive	Vocabulary section in textbook	3.76
32	5	Cognitive	Take notes in class	3.76
8	38	Social(consolidating)	Ask teacher for synonym of new medical word	1.52
35	39	Cognitive	Put medical words on physical objects	1.43
11	40	Social(consolidating)	Discover new meaning from group activity	1.36
34	41	Cognitive	Listen to tape of word lists	1.31
9	42	Social (discovery)	Ask teacher for a new sentence including the new medical word 1	1.19

In answering research question one, we look at the strategies used most and least frequently by the students. Table 1 lists the most and least preferred strategies for all subjects. Results reveal that item 29 (4.34, written repetition) has the highest average frequency, and next is item 28 (4.02, verbal repetition), followed by item 5 (3.84, using bilingual dictionary), item 33 (3.76, vocabulary section in the textbook) and item 32 (3.76, take notes in class). The least preferred strategies are item 9 (1.19, ask teacher for a new sentence including the new medical word), and next is item 34 (1.31, listen to tape of word lists), followed by item 11 (1.36, discover new meaning from group activity), item 35 (1.43, put medical words on physical objects), item 8 (1.52, ask teacher for synonym of new medical word).

Table 2: Most used and least used Strategies by High-level Students

Item	Rank	Category	Strategy	Mean
33	1	Cognitive	Vocabulary section in textbook	4.53
32	2	Cognitive	Take notes in class	4.42
5	3	Determination	Bilingual dictionary	4.25
28	4	Cognitive	Verbal repetition	4.19
32	5	Cognitive	Written repetition	4.07
35	38	Cognitive	Put medical words on physical objects	1.36
34	39	Cognitive	Listen to tape of word lists	1.31
11	40	Social(consoled-ating)	Discover new meaning from group activity	1.28
9	41	Social (discovery)	Ask teacher for a sentence including the medical word	1.17
13	42	Social(Consolidating)	Interact with foreign medical staff	1.17

Table 2 indicates that the most preferred strategies for high-level learners are item 33 (4.53, vocabulary section in the textbook), item 32 (4.42, take notes in class), item 5 (4.25, bilingual dictionary), item 28 (4.19, verbal repetition), and item 29 (4.07, written repetition). The least preferred strategies are item 13 (1.17, interact with foreign medical staff), item 9 (1.17, ask teacher for a sentence including the new medical word), item 11(1.28, discover new meaning from group activity), item 34 (1.31, listen to tape of word lists), and item 35 (1.36, put medical words on physical objects).

Table 3: Most-used and Least-used Strategies by Low-level Students

Item	Rank	Category	Strategy	Mean
29	1	Cognitive	Written repetition	4.04
28	2	Cognitive	Verbal repetition	3.76
10	3	Social(Consolidating)	Ask classmates for meaning	3.60
4	4	Determination	Guess from textual Context	3.28
5	5	Determination	Bilingual dictionary	3.28
35	38	Cognitive	Put medical words on physical objects	1.52
20	39	Memory	Use new medical word in sentences	1.52
34	40	Cognitive	Listen to tape of word lists	1.40
9	41	Social (Discovery)	Ask teacher for a sentence including the medical word	1.16
13	42	Social(Consolidating)	Interact with foreign medical staff	1.12

The most preferred strategy for low-level learners are, as shown in Table 3, item 29 (4.04, written repetition), item 28 (3.76, verbal repetition), item 10 (3.60, ask classmates for meaning), item 4 (3.28, guess from textual context); and item 5 (3.28, bilingual dictionary). The least preferred strategies are item 13 (1.12, interact with foreign medical staff), item 9 (1.16, ask teacher for a

sentence including the new medical word), item 34 (1.40, listen to tape of word lists), item 20 (1.52, use new word in sentences), item 35 (1.52, put medical words on physical objects). In answering research question three, we looked at nursing students' overall strategy use. Participants recorded an overall strategy use mean of 2.59. Thus, strategies are "sometimes used" by all participants. Additionally, the means of strategy use increase according to proficiency levels (means were 2.34, 2.50 and 2.83).

Table 4: Summary of Variation in Use of Overall Strategy

High (N=36)		Inter (N=28)		Low (N=25)		F	Significance
Mean	2.83	Mean	2.50	Mean	2.34	8.65	*p<.05
SD	0.47	SD	0.52	SD	0.44		

Overall strategy use, according to the ANOVA results in Table 4, varied significantly (F = 8.65, p < .05) across different proficiency levels. The post-hoc Scheffe test showed no significant difference for overall strategy use between intermediate and low levels, but significant differences did occur between high and each of intermediate and low levels. Although variation by proficiency was significant, all means fell between 2.5 and 2.8, the range which Oxford (1990) defines as medium use.

Table 5: Summary of Variation in Use of Strategy Categories

Category		High	Inter	Low	F	Significance
Determination	Mean	3.11	2.82	2.64	3.85	*p< .05
	SD	0.72	0.73	0.48		
Social (Discovery)	Mean	1.73	1.81	1.98	1.85	
	SD	0.47	0.46	0.58		
Social (Consolidating)	Mean	1.79	1.55	1.56	1.29	
	SD	0.71	0.61	0.69		
Memory	Mean	2.98	2.54	2.32	9.06	*p < .05
	SD	0.64	0.64	0.57		
Cognitive	Mean	3.22	2.95	2.65	6.99	*p < .05
	SD	0.53	0.69	0.54		
Meta- Cognitive	Mean	2.87	2.15	2.12	8.08	*p < .05
	SD	0.87	0.92	0.70		

A summary of the ANOVA results for the six categories is shown in Table 5. According to Table 5, proficiency level had a positive significant effect for the determination, memory, cognitive and metacognitive categories (all representing positive 12 variation, i.e., more use by more successful

students). With the determination and metacognitive strategy groups, the post hoc Scheffe test indicated low-level students (means were 2.64 and 2.12) used these strategies significantly less often than intermediate (means were 2.82 and 2.15) and high-level students (means were 3.11 and 2.87) did, but there were no significant differences in levels of use at the intermediate and high levels. With the memory group, the Scheffe test revealed significantly greater strategy use by the high-level students (mean 2.98) than by the intermediate and low groups (means were 2.54 and 2.32 respectively). With the cognitive group, high-level students (mean 3.22) used strategies significantly more frequently than both the intermediate (mean 2.95) and low students (mean 2.65) did

DISCUSSION

This section will discuss the medical terminology learning strategies of Saudis nursing students, the strategies found to used most often and least often by the nursing students who were most proficient in medical terminology.

In the present study, results indicate that there are major differences in patterns of strategy use among students of different proficiency levels. High-level students are better at gaining knowledge of a new word; they remember more effectively; they control and evaluate their own vocabulary learning better than low-level learners. However, neither the high-level students nor the low-level students are good at employing social strategies to discover new meanings and learn vocabulary. These social strategies involve asking for clarification or verification, cooperating with peers, and interacting with native speakers of the target language. Since teacher-centered approach is employed by most of the Saudis teachers, students rarely have chances to discuss and cooperate with peers. Moreover, very few students have courage to ask questions in class. This behavior might be influenced by the Chinese educational system. Furthermore, in an EFL context like Saudi Arabia, few chances are available for students to interact with native speakers or foreign medical staff.

 When strategies used by high-level students are compared to those by low-level students, it is found that written repetition and verbal repetition were the most and the second most popular strategies among both high-level and low-level students. This finding is consistent with Schmitt (1997), which showed that repetition of a word's verbal or written form was used frequently in Japan. This can be attributable to the learning style encouraged by the Saudi school system. Saudis students are commonly required to memorize vocabulary and grammar through repetition. Compared to Japanese, Chinese are more likely to use modeling and repetition as a means of studying particular skills. The practice of memorization is usually applied in the Chinese classroom so as to help students develop particular language skills through modeling and repetition (Sheridan, 1981). The practice of memorization is also linked to the Confucian tradition of reverence for authority. Thus, the strong preference for the bilingual dictionary can, at least partially, be attributable to Confucian tradition of reverence for authority as well. When students encounter questions or difficulties, they would look up dictionary to find the answer instead of resorting to the authority, represented by their teachers.

Not surprisingly, 'interact with foreign medical staff or native speakers' is relatively unused by both high-level and low-level students. English is studied as one of many foreign languages and serves little communicative function for students once they finish the actual course in Saudi Arabia. For most students, their non-native English-speaking teachers are their main source of English input. The use of English for any purpose outside the classroom is minimal and of short duration. Hence, very few students use English on a regular and long-term basis to establish social contacts with native speakers.

The lack of use of item 9 (ask teacher for a sentence including the word) by the subjects has also been influenced by their educational system and cultural background. As stated previously, in the Chinese-learning context, Chinese students are expected to listen to adults, not interrupt, sit quietly and listen attentively. As a result, they are reluctant to speak in the classroom even when invited to make comments or ask questions. Thus, when encountering a new word, they would just listen attentively to teachers rather than ask teachers for synonym and making new sentences. Many students believe that if they ask questions in class, there is a high risk of resembling a fool. Some would reflect carefully before participating, in order to be sure their point is valid and useful. Others would rather ask after class in order to minimize the loss of face if the questions seem foolish—their class will not hear them if they ask alone (Scarcella, 1990).

In light of the findings of Yang and Su's study (2003), the main difficulty nursing students encountered in speaking is their poor pronunciation. Nonetheless, to the knowledge of the researcher, none of the textbook used in Medical Terminology course in the researcher's school has included an audiotape on which word lists had been recorded to improve pronunciation and aural understanding of the words. Even though nursing pre-professionals have problems pronouncing these medical words, they are not able to find any single tape useful for solving their problems. Obviously, this could explain why item 34 (listen to tape of word lists) is one of the least used strategies by all nursing students.

Since the advantages of group work for language learning are not widely recognized, teacher-fronted teaching is still the main focus of classroom of Saudi Arabia. Some teachers are afraid of group work. They feel that they will lose control of the class; they cannot monitor all groups at once and students' errors will be reinforced in small groups. Naturally, for teachers who prefer teacher-centered approach, learning medical words is treated as an activity best achieved individually. The low usage of item 11 (discover new meaning from group activity) could be attributed to this factor.

CONCLUSION

The study sought to provide valuable information concerning the strategy use of Saudis nursing students at Northern college of Nursing when learning medical terminology and to explore what kind of relationship exists between strategy use and proficiency in medical terminology. Findings of the study revealed that nursing students at Northern College of Nursing in general prefer to use

written repetition, verbal repetition, bilingual dictionary strategies. In contrast, asking teacher for a new sentence including the new medical word, listening to tape of word list, and discovering new meaning from group activity are the strategies least used by students. Like previous researchers, we found significantly greater overall use of learning strategies among more successful students and significant differences by proficiency level in students' use of four strategy categories: determination, memory, cognitive and metacognitive. However, neither the high-level students nor the low-level students are good at employing social strategies to discover new meanings.

Pedagogical Implications
According to the results of the present study, high-level students appear to use learning strategies more frequently than low-level students. Investigating Chinese EFL learners' learning strategies of oral communication, Huang & Van Naerssen (1985) also found that distinguished successful students were more willing to take risks for employing strategies and practicing strategies than less successful students were. Learning strategies can be taught as found by some studies (Cohen & Aphek, 1980; O'Malley, Chamot, Stewner-Manzanaraes, Russo, & Kupper, 1985). Here are some tips that teachers have to know when teaching medical terms learning strategies. First, awareness of strategy use should be raised. To help students cultivate their awareness of medical terms learning strategies, teachers may introduce them to the wide range of alternative strategies, help students understand their own current strategies, and assist them to find out the circumstances under which a given strategy can be applied effectively.

Second, it is important for teachers to recognize that some strategies may be more suitable to some students than to others because of individual differences in strategy choice. If language teachers have a better idea of students' preference of strategy choices, they may teach students to choose some strategies which are more effective for students. Third, Schmitt's (1997) findings suggest that students naturally mature into using different strategies at different times of their life, so it seems reasonable to introduce them to a variety of strategies and let students decide which ones are right for them.
Ellis (1994) stated the beneficial effect of strategies may be relative to the kinds of tasks that strategies are deployed in. Effective strategy use may consist of the flexible deployment of the right strategies in the right task. Fourth, therefore, teachers may introduce the   strategies of learning medical terms and demonstrate how to take appropriate strategies to meet students' needs in different learning tasks. Finally, these strategies of learning medical terms should be practiced in different learning tasks. Only through numerous practices will help students become more familiar with these strategies of learning medical terms.

Limitations and Future Research Directions
 The limitations of the present study are essentially about the recruitment of subjects. First, all the subjects come from the same Northern College of Nursing college. The findings would be more useful if we recruited more students from different nursing college in Saudi Arabia. We need to know the extent to which the specific patterns of strategy use would occur in other nursing college and other cultural settings. Second, also worthy of further investigation is the relationship of year

of learning to the choice of individual strategies and combination of strategies. Owing to the unique semester system of the college where the research was conducted, nursing students of different year level were not all available at the time of research conducted. To get a whole picture of the trends of nursing students' strategy use, nursing students with different years of studying medical terminology should be included in the future study.

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