Metaphor Enriched Medical English Supplement for First-year Students in an Selected Chinese Medical University

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Abstract: Based on the conceptual metaphor theory, this paper focuses on applying the metaphor-enriched medical English supplement to the College English class to facilitate the metaphorical competence of students and the learning of Medical English, aiming to facilitate college students to migrate smoothly from English for General Purposes to English for Specific Purposes (Medical English). One unit in the textbook was selected to be analyzed from the prospective of metaphor and the related medical knowledge was supplemented. A test was conducted before and after the implementation as the pre-test and the post-test. The collected data were analyzed via NVivo 11 and SPSS 22.0. The result shows that metaphor-enriched medical English supplement did improve students’ metaphorical competence and enlarge their medical knowledge. On one hand, the metaphorical cognitive mechanism is consistent with the process of English learning which is an interaction between the old language knowledge and the new one. On the

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PUBLIC INTEREST STATEMENT

With the development of Cognitive Linguistics, more instructors have realized the importance of pervasive metaphors in English learning. It not only can be a bridge to enhance the language competence of students but also does have an effect on medical English learning and communication in the medical context which is the main concern of ESP (English for Specific Purposes) instructors. This paper tries to facilitate college students to migrate smoothly from General English to Medical English in terms of metaphor enriched Medical English instruction supplement. The phases for the preparation, implementation and feedback were discussed in detail which provides a practical guidance for English as Foreign Language instructors. The comparison of pre-test and post-test shows that metaphor enriched medical English supplement did improve students’ metaphorical competence and enlarge their medical knowledge.
other hand, it is an effective method to understand medical words by metaphoric thinking, that is, to perceive as many morphemes as possible from the existing Medical English terms and remember these terms in relation to their forms.

Subjects: Educational research; education studies; higher education; Bilingualism / ESL; continuing professional development; English & literacy/language arts

Keywords: Metaphor; metaphoric competence; medical English; English proficiency

1. Introduction

Although China’s College EFL (English as a Foreign Language) teaching has already brought the language competence into its curriculum (Ministry of Education of the People’s Republic of China, 2007), for college students, in their EGP (English for General Purposes) curriculum stage, the problem of “naturalness” still exists due to the imbalance in language forms and concepts between their native language (Chinese) and target language (English). Besides, in their ESP (English for Specific Purposes) curriculum stage, there is disconnectedness due to the changed contents and vocabulary. Like Medical English, there are more than 1500 new medical words being created every year. Hence, Medical English vocabulary instruction occupies an important position in English teaching. However, the current teaching approaches of Medical English vocabulary mainly focus on word-formation, memory skill and other functions of medical vocabulary. Students memorize the sound, form and meaning by repetition. Although students can use short-term memory by memorizing medical vocabulary, they will soon forget them due to their relatively limited general English.

One approach of improving the “naturalness” of college students and their Medical English learning is to use metaphors to improve the college students’ metaphoric competence and understanding of medical vocabulary in the General English instruction. The immediate purpose of this study is to gain a broader knowledge of the understanding of college students about metaphors and facilitate their Medical English learning by supplementing the topic-related metaphor-based Medical English knowledge to the College English class. The long-term purpose of this study is to solve the disconnectedness between the General English and Medical English.

2. Literature review

2.1. Conceptual metaphor theory

George Lakoff and Mark Johnson first put forward the concept in their book published in 1980, *Metaphors We Live By*. The Conceptual Metaphor Theory exerts great influence upon the cognitive study of metaphor and is also one of the central researches in the field of cognitive linguistics. Lakoff (1993) defines conceptual metaphor as “mapping from a source domain to a target domain” (p. 205). The formula “Target Domain Is Source Domain” (A IS B), or “Target Domain as Source Domain” (A AS B) was used in mapping. The use of capitalised letters is due to Lakoff and Johnson’s conventional use of mnemonics for labelling conceptual metaphors. Kövecses (2002) states that it is “where constituent conceptual elements of the source correspond to constituent elements of the target” (p. 6). According to Lakoff and Johnson (2003), understanding metaphor from a cognitive linguistic perspective requires us to distinguish conceptual metaphors from linguistic metaphors. Conceptual metaphors refer to a connection between two semantic areas which is at the level of thought, while linguistic metaphors are the spoken or written realizations of conceptual metaphors. They state that metaphor is not in the words, it is in the ideas; it is part of ordinary language, not only of poetry; it is used for reasoning. They also mention language instruction and learning. Besides the systematicity found in the reasoning of abstract concepts, there is also a systematicity in the usage of conventional expressions and novel language constructions. Therefore, linguistic expressions are ultimately grounded in experience: bodily, physical, social and cultural (Popova, 2003, p. 139).
2.2. Metaphoric competence
In order to improve second language learners’ proficiency in the target language, grammatical or communicative competence has been emphasized in L2 teaching (Danesi, 1988). Metaphoric Competence (MC), following Chomsky’s linguistic competence and Hymes’ communicative competence (Hymes, 1972), drew the interest of a number of L2 researchers like Gardner and Winner (1978), Low (1988), Danesi (1993), Littlemore (2001), and Littlemore and Low (2006). Nacey claims that MC is “a production and interpretation of metaphorical expressions which is often considered more challenging in an L2 than an L1” (Nacey, 2010, p. 32). She defines MC as “the ability to understand and produce metaphor” (p. 32). In other words, metaphoric competence is the ability of a person who is able to understand metaphors generated by others and who can use metaphors to communicate with others.

Although the importance of metaphoric competence in L2 learning and instruction is emphasized these days, it is still not viewed as an essential ability which must be developed and there are still many students who cannot understand and generate metaphors in L2 language. Some do not know how to use metaphors appropriately. Therefore, more attention should be paid to the improvement of metaphoric competence of L2 learners as well as L2 practitioners. Littlemore and Low once stated that “control over metaphor is one of the essential tools for empowering learners to cope successfully with native speakers” (Littlemore & Low, 2006, p. 2). They believe that metaphoric competence is very important for communicative competence.

2.3. Metaphor-enriched English language instruction
According to the retrieval results from China National Knowledge Infrastructure (CNKI), there are 16,246 papers about metaphor research from 2000 to 2019, but there are only 127 papers on the function of conceptual metaphor theory to language teaching. However, this issue has already drawn more and more attention of researchers nowadays. It has been applied to language teaching, especially second language teaching, mainly focusing on vocabulary teaching, cultural introduction, and cultivation of students’ language proficiency. Recently, the journal Metaphoric Competence and Foreign Language Instruction by Yan (2001) has discussed the relation between metaphoric competence and language learning. Of late, as a core competence in language learning, metaphoric competence has grasped the attention of many scholars. Liu and Shi (2002) explored the relationship between culture and metaphor from the aspects of cognitive science, linguistics, and psycholinguistics. They stated that metaphor is not only a linguistic phenomenon but also a cultural phenomenon. The interpretation depends on a large extent on the understanding and grasping of the target language culture (pp. 48–53). S. Y. Wang and Liu (2003) explored that it is a feasible way to teach culture from the aspect of metaphor in foreign language teaching (pp. 48–57). Y. Wang and Li (2004), based on contemporary metaphorical cognitive theory, emphasized metaphoric competence and language proficiency. They believed that metaphoric competence, language competence, and communicative competence together constitute the basic language use (pp.140–143). It has an important cognitive function for innovative thinking and broadening of ideas. Zhu (2005) made an attempt of a new English vocabulary teaching approach which is under the guidance of the prototype category theory, and proposed attention should be paid to the learning of basic category words, the explanation of polysemous words, and the recognition of metonymy and metaphor to enhance students’ interest in learning. They improve the classroom atmosphere and the quality of teaching (pp.98–101). Zhou (2006) discussed metaphor from a cognitive perspective and its role and significance in teaching. Taking conceptual metaphor as a way of thinking to improve students’ metaphorical thinking, vocabulary learning, pragmatic competence and cross-cultural communicative competence in English teaching (pp.134–136). Z. H. Zhao’s (2007) Conceptual Metaphor and Metaphor Teaching, Liu’s (2007) Conceptual Metaphor and EFL Learning in China: an Empirical Study. These dissertations make a detailed research of metaphoric competence and introduce it into language teaching and study.
However, there are few articles talking about the application of metaphor enriched materials in English for Specific Purposes (ESP) curriculum. Little has been done in putting forward some medical metaphors to better the current medical English teaching and learning. Therefore, further researches still need to be conducted on metaphor enriched ESP instruction in China.

3. Research design
This study explored the effectiveness of Metaphor Enriched English Language Instruction (MEEI) supplement for first-year college students in a selected university using convergent design. The results of the quantitative and qualitative data analyses were merged to provide both a quantitative and a qualitative picture of the research problem. In this research, the researcher and her non-English major class (145 students) participated. To test whether there was improvement on the students’ metaphoric competence and related medical knowledge, a pre-test and a post-test, respectively, were conducted at the beginning and the end of the selected passage (Deep Concern) which was adopted from the textbook *New Horizon College English Reading and Writing*. This is then supplemented with metaphor-enriched medical knowledge. The test was a modification of Wei Yaozhang’s questionnaire on investigating the influence of cognitive competence on students’ understanding and generating of metaphors (Wei, 2007). Before the implementation, metaphors in this passage were identified by using the Metaphor Identification Procedure (MIP) and the supplementary materials were introduced; then, the researcher instructed with the supplementary materials and assigned the homework. After implementing the text, the same metaphoric competence test was conducted for the student participants and the data of two tests were analyzed by NVivo 11 and SPSS 22.0.

4. Implementation
The implementation process involves the preparation, implementation and feedback for Metaphor Enriched Medical English Supplement (MEMES) of the selected passage. The details of each phase are as follows.

4.1. Preparation for MEMES
During the preparation phase, selection of supplementary unit, time arrangement, learning of metaphor theories, text-based metaphor identification and text analysis were planned by the researcher. According to the academic calendar, each passage in the textbook should be completed in 2 weeks. For each week, there are two successive periods for English learning and each period takes 40 minutes. The passage *Deep Concern* was selected for its theme can be related to the nervous system. In the first period, the researcher cited and explained metaphors and metaphorical expressions in the text. During the second period, the definition of metaphor, as well as linguistic metaphor and medical metaphor were introduced to the students. The topic of *Deep Concern* refers to the parents’ anxiety for their teenaged girl. Metaphors of anxiety and the knowledge relating to the nervous system were supplemented. The assignment of watching a video called *The Nervous System* was assigned. In the third period, the researcher reviewed the video and interpreted new words and phrases in the text. In the fourth period, metaphoric affix was supplemented in the class to enhance the students’ understanding of the nervous system.

How to identify the metaphors in the text was the core issue. Conceptual metaphor theory provides a systematic tool to identify the concepts behind the linguistic metaphors. In addition, metaphor identification procedure (MIP) provides an explicit and reliable instrument for identifying linguistic metaphors. *Table 1* lists the linguistic metaphors in the text *Deep Concern*.

4.2. Implementation for MEMES
The implementation of the text *Deep Concern* was carried out in four periods which ranged from 16/10/2019 to 29/10/2019. During the implementation phase, four parts were discussed in detail,
Table 1. Linguistic metaphors in deep concern

| Categories       | Structural metaphor | Orientational metaphor | Ontological metaphor |
|------------------|---------------------|-------------------------|----------------------|
| verbs            | bug                 |                         | container            |
| nouns            | anchor              |                         | entity               |
| verbal phrases   | bolt out (of the house) | turn up | make ones blood boil |
| nominal phrases  |                     |                         | knot (in stomach)    |

namely, introduction metaphors in the text, explanation metaphor theories to the students, metaphor mechanism analysis and supplementation of metaphoric medical knowledge.

4.2.1. Periods 1 and 2 of MEMES
Since there was no break between periods 1 and 2, the researcher took these two periods as a whole. In periods 1 and 2, after finishing the text interpretation, students were asked to think about the usage of some metaphor words and phrases. Then, the researcher came up with the definition of metaphor. Since the students were not familiar with the metaphor and its classification, the traditional view of metaphor and the conceptual metaphor were explained to the students.

i) Conceptual Metaphor Theory and its Cognitive Functions

According to Lakoff and Johnson (1980), metaphor is not simply a matter of words or linguistic expressions but of concepts, of thinking one thing in terms of another (p. 6). Lakoff (1993) defines conceptual metaphor as “mapping from a source domain to a target domain” (p. 203). For example, there is a metaphor, make one’s blood boil, which is the linguistic metaphor of ANGER IS THE FLUID IN A CONTAINER. The researcher had analyzed the mapping between the target domain ANGER and source domain FLUID. The details are in Table 2.

ii) Brain Storming

The researcher tried to enhance the students’ understanding of the topic in terms of metaphors. The students were required to do a brainstorming. The questions were: “What will the generation gap bring?”, “Quarrel?”, “Lack of understanding?”, “Anxiety?” and so on. After the students answered these questions, the teacher continued to inspire the students by asking them: “Can you feel the anxiety of Sandy’s parents?”, “How to describe anxiety to others?”. Further, the students were asked to find out metaphors of anxiety from Emma Ston’s words: “I Am Bigger Than My Anxiety”. Emma Ston is the

Table 2. The mapping between ANGER & FLUID

| Target Domain       | Mapping | Source Domain              |
|---------------------|---------|----------------------------|
| anger               |         | fluid                      |
| anger level         |         | fluid level                |
| body                |         | container                  |
| body pressure       |         | container internal pressure|
| body agitation      |         | container agitation        |
| body heat           |         | container heat              |
heroine of the popular film *La La Land*. She suffered from anxiety for a long time, and from this paragraph, the readers can sense it from her vivid description of anxiety:

Emma Ston

_I drew a little green monster on my shoulder that speaks to me in my ear and tells me all these things that aren't true. And every time I listen to it, it grows bigger. If I listen to it enough, it crushes me. But if I turn my head and keep doing what I'm doing—let it speak to me, but don't give it the credit it needs—then it shrinks down and fades away._

(as cited in Allyson Koerner, 2016)

Then there was another brainstorming: Since anxiety is a feeling inside, how can you feel it? The students were guided to think about the relationship between anxiety and human body. Another question was: “Will anxiety cause change in physical conditions?” If yes, “which body system will be affected by anxiety?” After discussing the answers to this question, the teachers continued to ask: “Do you know which part of the Nervous System controls the feeling of anxiety?” They asked the students to find out the answer in the video. That was given as an assignment for these two periods of class.

iii) Metaphor Enriched Assignment

In order to enhance the students’ understanding of medical metaphors, a video Introduction to The Nervous System was assigned to the students at the end of the second period. It was produced by Career and Technical Education (CTE) skills which specializes in creating customized educational videos for high schools and colleges. It was a quality video meant to complement the classroom instructions. The video lasted for 9 min and mainly introduced the Central Nervous System (CNS) and the Peripheral Nervous System (PNS) with clear pictures, Standard English pronunciation with English subtitles. It is an integrated video comprised of set induction, main content and recaps. Most importantly it contained some metaphorical pictures which could help the students better understand the functions of the components of the nervous system. So, these pictures were chosen to be analyzed by the students to enhance their metaphorical comprehension and medical content comprehension.

4.2.2. Periods 3 and 4 of MEMES
During periods 3 and 4, the assignment of watching a video was reviewed and related supplementary materials were provided to the students.

i) Metaphor Enriched Assignment Review

The students were required to watch the video *Introduction to the Nervous System* and find out the following three pictures in it, and try to answer the related questions. The first picture of the assignment is as follows:

There are four questions relating to this picture. Question 1 refers to the exercise in the picture and the implied meaning of this sport in this video. Almost all the students knew the answer “yoga” and it is used to describe the function of the nervous system. Question 2 asks the students to come up with a metaphor, and some students gave the right answer. That is, THE FUNCTION OF THE NERVOUS SYSTEM IS LIKE DOING YOGA (small capital letters are used to distinguish conceptual metaphors from linguistic metaphors).

Then the researcher emphasized the similarities of yoga and nervous system which can be found in the Figure 1. What's more, the tenor and vehicle of this metaphor were identified in Figure 2.
In Figure 2, “THE FUNCTION OF THE NERVOUS SYSTEM” is the tenor which refers to the subject under discussion. “DOING YOGA” is the vehicle which refers to what the subject is compared to. Question 3 refers to writing down the similarities between the nervous system and yoga. The most frequent answers are: Both can make balance; Both can coordinate all the activities of body; Both can regulate heart rate. Question 4 asks the students to come up with their own metaphors of the nervous system. The summary of the students’ metaphors can be seen in Table 3, in which the tenors and vehicles, as well as the similarites of their metaphors were listed.

| Tenor                                      | Vehicles                                      | Similarities                                      |
|--------------------------------------------|-----------------------------------------------|--------------------------------------------------|
| The nervous system                         | a coordinator/a scale/a band                  | both can coordinate all the activities of body    |
|                                            | a big tree/river/road                         | both have many branches                          |
|                                            | A CEO/chairman/monitor/manager/administrator/| both can control our body                         |
|                                            | police/leader/commander/big boss/king/president |                                                 |
|                                            | an telephone line/emitter/processor           | both can sent message                            |
|                                            | a baby                                        | both are very fragile                            |
|                                            | a riddle/black hole                           | both are mysterious                              |
|                                            | sun/water                                     | both are necessary                               |
|                                            | an organization/                              |                                                 |
|                                            | a railway station                             |                                                 |

By analyzing the tenor and vehicle of the metaphor "THE FUNCTION OF THE NERVOUS SYSTEM IS LIKE DOING YOGA", the students could enhance their metaphor interpretation; then they tried to come up with new metaphors which were good for their metaphor creation. In addition, they could easily understand the function of the nervous system and brain via metaphors.
ii) Supplementary Materials: Metaphoric Words on the Nervous System

The three main etymologies of Medical English vocabulary are Anglo-Saxon, Greek and Latin. Most of them originate from Greek and Latin, especially clinical Medical English vocabulary is mostly related to Greek, anatomy words are often related to Latin.

(a) Metaphorical words Originate from Greek

It is said that about three-quarters of the Medical English vocabulary are from Greek. One reason is that the father of medicine, Hippocrates, was a physician in the ancient Greek Pericles era, and the other reason is that Greek is easy to construct new vocabulary. Whenever a new disease or new methods appeared, Greek was used as basic roots, and prefixes and suffixes were added to form new words. For example, “appendicitis”, “-itis” comes from Greek, which means indicating inflammation of a specified part; “appendix” comes from Latin “append”, which means a subordinate part attached to something. They combined to form a new medical term. By learning these affixes with metaphorical meanings, the students can increase their interest in learning and deepen their understanding and memory of medical vocabulary. Some metaphorical words, relating to the nervous system, which originate from Greek, are listed in the following table. For example, arachnoid mater, dendrite, thalamus, neuroglia, synpse, aphasia, astrocytoma, syncope and lobe. The metaphoric meanings of these words are listed in Table 4.

For example, the word arachnoid (mater) is a metaphoric word, the original meaning of arachne is spider, “-oid” means resemblance. Hence, the word arachnoid means spider-like. There is a classical myth behind it. Arachne was a young girl in Greek mythology who was good at weaving and embroidering. She once challenged the Greek goddess Athena to weaving and she won. Athena tore her fabric into pieces because of her anger. Arachne wanted to hang herself, but was turned into a spider by Athena, forever weaving the web. Therefore, Arachne has the meanings of spider and arachnoid (Collins Dictionaries,
Table 4. Metaphorical words originate from Greek

| Terms             | Words from Greek                  | Meanings                                                                 |
|-------------------|-----------------------------------|--------------------------------------------------------------------------|
| arachnoid mater   | archn (arachne): spider           | delicate web-like layer of the meninges                                  |
| dendrite          | relating to a tree                | one of two processes extending from a neuron cell body; the other is the axon |
| thalamus          | a bed, a bedroom                  | part of the brain that processes sensory information                     |
| neuroglia         | neur/o: nerve                      | cells within both the CNS and PNS                                         |
| synapse           | syn-: together                    | the connecting point between nerve cells or between a nerve cell and a receptor or effector cell |
| aphasia           | (a) : absence of                   | loss of speech                                                            |
| astrocytoma       | astro- (astron): star             | star-shaped tumor that usually develops in the cerebrum                  |
| syncope           | a cutting short, a swoon          | fainting                                                                  |
| lobe              | vegetable pod                     | a somewhat rounded subdivision of a bodily organ or part                  |

Note. Bold words are metaphorical. Source: Collins and DePetris (2011). A Short Course in Medical Terminology (2nd Edition). Lippincott Williams & Wilkins.

2016). Figure 3 which adopted from the Alexandria Huntington shows the myth of Athena and Arachne. It belongs to the ontological metaphor.

b. Metaphorical Words Originated from Latin

Rome established the world’s earliest public medical school in 1400 B.C. In the Middle Ages, Latin was the medium of communication between different European countries at that time, and it was also the language for the study of science, philosophy and theology. In terms of medicine, the Romans also developed their country under the influence of Greek medicine. In 1543, the founder of modern human anatomy Andreas Vesalius (1956) completed the great work “De humani corporis fabrica” (the structure of the human body). This Latin-written book laid the foundation for Latin in Medical English anatomy vocabulary. In 1895, Latin was recognized as the international language of the world’s medical community, and it was required that regular prescriptions or drug names be written in Latin, which more and

Table 5. Metaphorical words originate from Latin

| Terms             | Words from Latin                  | Meanings                                                                 |
|-------------------|-----------------------------------|--------------------------------------------------------------------------|
| cerebrospinal fluid | archn (arachne): spider           | delicate web-like layer of the meninges                                  |
| dura mater        | relating to a tree                | one of two processes extending from a neuron cell body; the other is the axon |
| neurotransmitter  | neur/o: nerve                      | chemical released by the presynaptic                                     |
| parietal (lobe)   | pariet- (parietalis): walls       | the part of the brain that processes information from the sense of touch and other sensory and motor tasks |
| pia mater         | tender mother                     | inner layer of the meninges                                              |
| pons              | bridge                            | the part of the brain stem that passes information to the cerebellum and thalamus to regulate subconscious somatic activities |

Note. Bold words are metaphorical. Source: Collins and DePetris (2011). A Short Course in Medical Terminology (2nd Edition). United States: Lippincott Williams & Wilkins.
more showed the status of Latin in medical languages. Therefore, supplementing metaphorical words with Latin etymology can help students understand and memorize medical words. For example, the words including cerebrospinal fluid, dura mater, neurotransmitter, parietal (lobe), pia mater and pons. Their metaphorical meanings can be seen in Table 5:

5. Findings

5.1. Descriptive analysis of results of MCT and NCEE

In order to ascertain the improvement of the students’ metaphorical competence, two tests including the pre-test and the post-test were assigned to the students. The resources of the test were adopted from Adapted from Jiao Weida’s Metaphoric Competence Test. The full score is 100 and the participants were required to complete it within 40 min. This test comprises three parts: metaphor recognition, metaphor interpretation and metaphor production. For metaphor recognition, there were 20 sentences which require the students to judge as to what extent they are metaphor expressions. For metaphor interpretation, five conceptual metaphors were provided and the students are supposed to write down the similarities between the source domain and target domain. For metaphor production, two sentences were completed by the students, namely, “Learning English is ... ” and “Treating illness is ... ”. Fifteen marks for each sentence, and each correct answer gets three marks. A high score indicates that the participants are more competent in understanding and producing L2 metaphors.

One hundred and forty-five students of the researcher’s class participated in the pre-test and the post-test. One hundred and thirty-six of them completed and returned the questionnaires. For the results of the pre-test and the post-test, a statistic descriptive analysis was conducted. Table 6 shows a statistic description of the participants’ scores in the Metaphoric Competence Test (MCT) and the National College Entrance Examination (NCEE).

As is shown in Table 6, the arithmetical average score of NCEE is 79.31, of the pre-test is 39.87 and of the post-test is 56.46. It is obvious that the student participants did not perform well in the pre-test and the post-test compared with their NCEE marks, though their post-test scores have improved positively compared to their pre-test ones. In the 136 candidates, the highest mark of the NCEE is 95, and the lowest is 35. The range or the spread of different marks from the maximum 95 to minimum 35 is 60. The highest mark of the pre-test (MCT) is 71 and the lowest is 9. The range or the spread of different marks is 62. The highest mark of the post-test (MCT) is 81 and the lowest is 27. The range or the spread of different marks is 54. The standard deviation of the NCEE is 8.636, of the pre-test (MCT) it is 10.986 and of the post-test it is 11.247. Based on this histogram and the negative skewness −.228 (pre-test) and −.012 (post-test) reported in Table 12, we can conclude that it is negatively skewed. The kurtosis of the two curves is .145 (pre-test) and −.545 (post-test) which means the curve of the pre-test is leptokurtic and the curve of the post-test is platykurtic. It shows that most of the two MCT marks centered in the middle and lower part are quite different from the marks in the NCEE.

| Table 6. Descriptive statistics of MCT and NCEE |
|-----------------------------------------------|
|                                              |
| **NCEE**                                     |
| Num of valid cases                           | 136 |
| Mean                                         | 79.31 |
| Std. Deviation                               | 8.636 |
| Range                                        | 60 |
| Skewness                                     | −1.843 |
| Kurtosis                                     | 5.761 |
| Minimum                                      | 35 |
| Maximum                                      | 95 |
| **MCT**                                      |
| Pre-test                                     | 39.87 |
| Std. Deviation                               | 10.986 |
| Range                                        | 62 |
| Skewness                                     | −.228 |
| Kurtosis                                     | .145 |
| Minimum                                      | 9 |
| Maximum                                      | 71 |
| Post-test                                    | 56.46 |
| Std. Deviation                               | 11.247 |
| Range                                        | 54 |
| Skewness                                     | −.012 |
| Kurtosis                                     | −.545 |
| Minimum                                      | 27 |
| Maximum                                      | 81 |
5.2. Part A in MCT

The researcher had analyzed each part between the pre-test and the post-test of the MCT to find out whether there was an increase in the two scores. The details can be seen in Table 7.

| Part    | Average score of the pre-test | Average score of the post-test |
|---------|-------------------------------|-------------------------------|
| Part A  | 15.43                         | 15.97                         |
| Part B  | 11.29                         | 18.22                         |
| Part C  | 5.29                          | 12.68                         |
| Total score | 39.87                     | 56.46                         |

Note. N = 136.

It is evident that there is an increase for each part compared to the pre-test average score with the post-test one, while there is a little decrease for part A which means that the students may not be familiar with the metaphor theories after the implementation. There was also a paired-samples t-test to compare the average scores of the pre-test and the post-test. The result can be seen in Table 8.

| N               | Correlation | Sig. |
|-----------------|-------------|------|
| pre-test & post-test | .394        | .000 |

There is a significant difference between the mean scores of the pre-test and the post-test with p = .000 (P < 0.05). These results suggest that the Metaphor Enriched English Language Instruction Supplement really did increase the students’ metaphoric competence.

5.3. Part B in MCT

The interpretations of this metaphor in two tests can be grouped into four main categories, namely, process, properties, significance and condition. Figure 4 shows the categories generated in the two tests.

5.3.1. Analysis of LOVE IS A JOURNEY

The students’ answers regarding the similarities can be discussed from four different metaphorical highlighting: the first one is “process”. In the pre-test and the post-test, both love and journey were viewed as a process which could “Both will meet different people.”, “Both have starts and ends.” and “Both can be long and short.”. There was no new expression in the post-test. The second one is “properties”. There were nine sub-categories which related to the property, including interest, mystery, mood, challenge, variety, effect, uniqueness, freshness and right of choice. As for interestingness, “Both are interesting.” was mentioned in two tests. In regard to the mystery, “Both are unpredictable.” was used in two tests. Concerning mood, “Both will bring people joy.” was used in two tests, “Both make people feel tired.” was used only in the pre-test. Relating to challenge, “Both will face hardships/challenges/setbacks.” were the expressions used in two tests. Regarding variety, “Both are colourful.” was the expression used only in the post-test. As for effect, “Both are memorable/desirable.” were the expressions used in two tests. “Both make people feel comfortable.” was used only in the post-test. As for uniqueness, “Both are unique.” was expressed only in the post-test. In terms of freshness, “Both are fresh.” was used both in two tests. As for right of choice, “Both are free-spirited.” was used only in the post-test. The third one is “significance”. “Both are valuable.” was mentioned in two tests. In addition, “Both are spice of life.” and “Both can enrich experience/make people grow up.” were mentioned only in the post-test. The fourth one is “condition”. In two tests, “Both need time/money/giving/patience/exploring/companion/involvement.” were mentioned by students. The expression, “Both need energy/insistence.”, appeared only in the post-test.
5.3.2. Analysis of IDEAS ARE FOOD

All the interpretations of IDEAS ARE FOOD can be grouped into three main categories, namely, significance, properties, and condition. Figure 5 shows the categories generated in two tests.

The first one is “properties” which contains four sub-categories including mood, feature, variety and resource. In terms of mood, “Both make people happy/satisfied.” appeared in the pre-test and the post-test. Concerning feature, “Both are nutritious/creative/changeable.” were used in two tests. “Both are worthy of sharing.” was found only in pre-test. As to variety, “Both are abundant.” and “Both have good ones and bad ones.” were expressed in two tests. Regarding resource, “Both are hard-earned.” was mentioned in two tests. “Both are sustainable.” appeared only in the post-test. The second one is “condition”. “Both are hard-earned/need great effort.” was an expression found in the pre-test and the post-test. “Both need patience.” appeared only in the pre-test, “Both are time-consuming.” appeared only in the post-test. The third one is “significance”. “Both are necessary.” and “Both can solve problems/supply energy/sustain life/promote development/change life/create wealth.” were the expressions mentioned in two tests. “Both bring people hope.” appeared only in the post-test.
5.3.3. Analysis of DEPRESSION IS FALLING INTO AN ABYSS

The interpretations of DEPRESSION IS FALLING INTO AN ABYSS in the pre-test and the post-test were grouped into three main categories, namely, properties, result, and mood. Each main category also includes different entailment. Figure 6 shows the categories generated in two tests.

The first one is “negative mood”. “Both are scared/lonely/hopeless.” were expressions mentioned in the pre-test and the post-test. “Both make people anxious.” appeared only in the pre-test. The second one is “properties” which contains many sub-categories including hard to get out, depth, descend, dark and dangerous. “Both are hard to get out.”, “Both are bottomless/deep.”, “Both are falling down.”, “Both are dark.” and “Both are dangerous.” were the expressions mentioned in the pre-test and the post-test. The third one is “result”. “Both leave people in low spirits.” and “Both will make a crash.” were expressions mentioned in the pre-test and the post-test. In addition, “Both are exhausted.” and “Both bring people trouble.” appeared only in the post-test.

5.3.4. Analysis of HUAMAN BODY IS A BATTLEGROUND

The interpretations of similarities between two domains can be grouped into four categories, namely, property, function, result and war. Figure 7 shows the categories generated in two tests.

The first one is “properties” which is the main category in the students’ answers of similarity between the human body and battleground. It has become a conventional metaphor. In pre-test and post-test, “Both are complex.” and “Both are tense.” were the expressions used in two tests. “Both need replacement.” appeared only in the post-test. “Both are unpredictable.” and “Both have competition and cooperation.” were used only in the post-test. The second one is “function”.

“Both have division of labour” was the expression found in the pre-test and the post-test. “Both have many parts/running systems/repair function.” and “Both can wipe out harmful things.” appeared only in the post-test. The third one is “result”. The similarity in the effect was also listed.
Figure 6. Categories generated in the pre-test and the post-test on DEPRESSION IS FALLING INTO AN ABYSS.

Note. Words in yellow are the categories generated in the pre-test and the post-test. Words in blue are the categories only generated in the pre-test. Words in blue are the categories only generated in the post-test.

Figure 7. Categories generated in the pre-test and the post-test on HUAMAN BODY IS A BATTLEGROUND.

Note. Words in yellow are the categories generated in the pre-test and the post-test. Words in blue are the categories only generated in the pre-test. Words in blue are the categories only generated in the post-test.
“Both have casualties.” and “Both have failure and success.” were terms used by the students in the pre-test and the post-test. The fourth one is “war” which is frequently found in the answers of the students. The expressions “Both have invasion and defense/a defense system/soldiers and enemies.” were found in the pre-test and the post-test. “Both have a commander.” and “Both exist in struggle.” appeared only in the post-test.

5.3.5. Analysis of BRAIN IS A MACHINE
The interpretations of similarities between source domain and target domain in two tests can be grouped into three main categories, namely, property, function and significance. Figure 8 shows the categories generated in two tests.

The first one is “properties”. In the pre-test and the post-test, “Both are maintainable/complex/cooperative.”, “Both will be aging/have a life span.” and “Both can serve people.” were the expressions listed by the students. The expression “Both can be repaired” appeared only in the post-test. The second one is “function”. “Both can perform tasks/follow instruction/handle information/create something/compute.” and “Both have an operating mechanism.” were the expressions mentioned in two tests. “Both can work ceaselessly.” appeared only in the pre-test. The third one is “significance”. “Both need updating.” and “Both need energy supply.” were the expressions found both in the pre-test and the post-test.

5.4. Part C in MCT

5.4.1. Metaphors generated by students on “Learning English is ...”
According to the metaphors given by the students, eight superordinate categories of English learning which exist both in the pre-test and post-test were generalized, as well as one unique expression in the pre-test or post-test. The detailed expressions can be viewed in Table 9 and Table 10.
## Table 9. Metaphors generated in part C: “Learning English is ...”

| Classification          | Same Source Domain in the pre-test & the post-test | Source Domain in the pre-test | Source Domain in the post-test |
|-------------------------|-----------------------------------------------------|-------------------------------|--------------------------------|
| Journey/Movement        | a (long) travel/journey marathon                    | planting trees               | a long distance running working out a math problem accumulating wealth |
|                         |                                                     | sailing in the sea           |                                |
| Playing/Leisure         | listening to music playing a game singing a song    | dancing playing with the toy | swimming in the sea playing piano |
|                         |                                                     | playing guitar               | watching a movie               |
|                         |                                                     | playing in a beautiful garden| climbing stairs                |
|                         |                                                     | cooking                       | hiking                         |
|                         |                                                     |                               | tasting tea                    |
|                         |                                                     |                               | digging a wall                 |
|                         |                                                     |                               | sowing a seed                  |
| Exploration             | climbing a mountain                                 |                               | walking in the maze finding treasure |
| Construction work       | building a house                                    | building a bridge            | building a skyscraper          |
| Experience              | making a friend/getting a girlfriend flying in the sky opening a door/window to a new world a baby learning to walk | enjoying the beautiful scenes exploring the universe walking in the desert wandering among flowers picking up flowers on the garden swimming in the knowledge of ocean bathing in the spring breeze | walking in the forest crossing the sea enjoying the sunshine communicating with wisdom absorbing nourishment talking with a foreign friend |
| Building                | building a house/bridge                             |                               | building a skyscraper/a road/blacks/tower/a beautiful garden |
| Food & Drinking         | eating candy                                        | eating coptis (Chinese medicine) eating durian | eating apples eating a cake eating nutrition supplies taking pills |
|                         | eating delicious food                               |                               |                                |
| Things                  | a cup of coffee a bird singing on the tree a bottle on endless road | ten years' anti-Japanese war a glass of water when you are thirsty a bird singing on the tree a game an adventure | a cup of tea a pair of wings a door that leads to foreign culture |
|                         |                                                     |                               |                                |
| Note. Coptis refers to small genus of low perennial herbs which having yellow rhizomes and white or yellow flowers. |
Table 10. Metaphors generated in part C: “Treating illness is …”

| Classification | Same Source Domain in the pre-test & the post-test | Source Domain in the pre-test | Source Domain in the post-test |
|----------------|----------------------------------------------------|------------------------------|--------------------------------|
| Journey/Movement | a long journey a marathon climbing the mountain | climbing a high mountain | walking in the desert dancing with death guarding our homeland washing dirty clothes |
| Experience | lost in a forest working out a math problem a woodpecker pecking a tree | looking for a needle from the forest extracting the silk thread crossing the desert waiting for the rising sun in the dark being locked in a dark room without sunshine | going to prison seeing the sunlight again living in the dark walking in a tunnel which can only see a light climbing a cliff falling into darkness watering the dying flowers catching bugs on the tree catching the thief taking an exam dispelling the clouds and see the sun saving someone from the fire catching a snake |
| Playing/Leisure | game with foe | | |
| war/battle/gamble | fighting a war/battle a fight with monster defeating/fighting with enemy | fighting with tiger a fight with demons/evil forces/ghost | gambling |
| Repair | repairing a machine | filling a hole | mending clothes repairing a broken car |
| Match/race | a race against death | a boxing match a competition | |
| Things | an abyss | a tree looking for sunshine nightmare/rainstorm sunlight in a deep canyon a running race |

Unique expressions in the pre-test or the post-test

| Exploration | crossing a river finding bugs in a computer | seeking a road to future |
| Cleaning | cleaning drains throwing garbage cleaning room killing pests | mowing in the garden clearing away weeds in wheat fields |
| Construction work | | constant dripping of water |

5.4.2. Metaphors generated by students on “Treating illness is …”

6. Conclusions

6.1. Metaphor enriched medical English supplement

How to supplement the medical knowledge of the students of the General English class is the main concern of the researcher. First, the researcher decided to supplement the nervous system which can relate to the topics of Deep Concern and realized the transition from the unit topics to their related medical knowledge by brainstorming. For example, talking about anxiety, metaphors of anxiety were added and brainstorming was conducted. “Which body part experiences the human’s anxiety?” was the question asked to ignite the process of thinking in the students. Second, time arrangement was another
thing to consider. In this research, the metaphor enriched supplement took 30–40 min which took nearly a quarter of the whole unit hour. Besides, students were provided more opportunities to use metaphors. For example, they were required to complete the metaphor-related assignments and make more metaphorical sentences. Fourth, students’ high-level thinking was supported. For example, the researcher analyzed several pictures in the video to help students understand the functions of the nervous system as well as inspiring students’ metaphorical thinking. H. Zhao (2018, p. 267) claims animation is extremely helpful, especially during the explanation of the underlying force dynamics for the semantic network of the word, since different force patterns can be well illustrated through the animated movement of the objects. These findings are also in line with Tomlinson’s statement that second language acquisition is facilitated by a rich and meaningful exposure to language in use; affective and cognitive engagement; making use of mental resources used in communication in L1; noticing how L2 is used; being encouraged to interact and allowed to focus on meaning (Tomlinson, 2013, p. 99). There are also some suggestions for improvement. First, the supplementary materials should be moderately difficult. During the implementation, a video called The Nervous System was assigned as the homework, while students could not fully understand the video due to the medical terms inside. Subtitles for this video were suggested to be added. The three teachers discussed the students’ feedback and provided the transcript to students. Second, the speed of the supplementary videos should be lowered due to the lack of Medical English vocabulary. In a word, the supplementary materials did improve their metaphorical competence and paved the way for the future Medical English study.

6.2. Metaphoric competence

Comparing the mean scores of the National College Entrance Examination (NCEE) with the pre-test and the post-test of the Metaphoric Competence Test, the mean score of the NCEE was above 70 and the mean score of the post-test was under 60 which was the passing score for the test. It showed that they did well in the NCEE while their mean score of the pre-test and the post-test was relatively low. The mean score of 136 participants of the NECC was 79.3, of the pre-test and the post-test were 39.9 and 56.5. A paired-samples t-test to compare the mean score of the pre-test and the post-test was conducted, and the result showed that there was a significant difference in the mean score of the pre-test and the post-test with p = .000 (P < .005) which suggested that the Metaphor enriched English Language Instruction Supplement did help to increase the students’ metaphorical competence.

The data of the metaphor recognition (Part A) showed that students did best in recognizing metaphors which belong to “The Same or Nearly the Same Concepts”. It is easy for students who know both Chinese and English to understand this type of conceptual metaphors since these two languages share the same or nearly the same underlying concepts or conceptual systems. This is then followed by “Non-corresponding Concepts”. Although this type of conceptual metaphors stems from a different social and cultural background, they have already been the conventional metaphors which can be understood. Students did badly in recognizing metaphors which belong to “Different Concepts”. This type of conceptual metaphors that are based on different concepts or conceptual systems results in much confusion since the concepts in different languages are not the same and people tend to understand the concepts of their own. The data of the metaphor interpretation (Part B) and the metaphor production (Part C) showed that students came up with more similarities and generated more metaphors in the post-test compared to the pre-test, after completing the same kind of assignments and learning from the teachers’ interpretation of the metaphorical mappings. Therefore, metaphor enriched medical English supplement is an effective approach to improve students’ metaphorical competence which has been proved to be correlated with English proficiency. It can be used to solve the current test-oriented English teaching. This finding is in line with Cooper’s (1999, pp. 69–77) statement that students with metaphoric competence could interpret idiomatic expressions in L2 successfully. Andreou and Galantamos (2008) also suggested that metaphor competence could be included as part of communicative competence pedagogy because of its various functions that can be connected to grammatical and lexical cues.
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