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GLOCALIZED RHETORIC PRACTICES ON MEDICAL WRITING

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Abstract

Facing a rapidly changing global environment, educators around the world have argued for a need to incorporate a global perspective in local educational policy making. The present study undertakes such a glocal project examining medical writing of international physicians and Taiwanese interns. In this study, the Corpus of English for Medical Purpose (CEMP) has been created. There are 50 experts' (49,655 words) and 50 students' (9,829 words) medical writing samples respectively. The moves and steps used between the two groups were analyzed from three linguistic features, voice form, tense, and grammatical subject. Then, a parallel corpus was consulted in an attempt to explain the rhetoric features unique to Taiwanese writers. Based on the findings, a framework is proposed to provide guidance for the instruction and learning of medical writing. The findings contribute to medical education by highlighting how the dual forces of the target and native languages shape students' medical writing.

Keywords: glocalization; medical writings; parallel corpora; corpus-based study

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1. Introduction

Glocalization is the concept that describes a natural and an inevitable result of the global process. Based on the work of Robertson (1995, p.25), it is defined as “the simultaneity—the co-presence—of both universalizing and particularizing tendencies.” Through such mixture of the global and the local, hybridization and diversity are

produced, having gradually moved away from uniformity. Glocalization is most visible in global business. Among the examples are international food and beverage companies that have introduced rice burgers and Chinese style ham-and-cheese breakfast pastry.

The phenomenon of glocalization has become an academic research interest as education policies must respond to the global environment in which it finds itself. Brooks and Normore's (2010) study revealed an interconnection between worldwide discourses and processes, as well as local educational practices and policies, and thus have argued for a need to incorporate a glocal perspective in educational policy making. That is, educators around the world should confront the reality that globalization has influenced local educational practices (also workplace), and be prepared to undertake meaningful integration of local and global forces. In their article, Brooks and Normore (2010) identified nine specific domains in which the glocal perspective is most needed: political, economic, cultural, moral, pedagogical, information, organizational, spiritual and religious, and temporal literacy.

Examples of such glocalization are found in several studies. In China, English has been appropriated and adapted, or *glocalized*, by the Chinese users of the language (Shi, 2013). In Taiwan, it was found that the country's art education and related educational policies have incorporated the experiences and theories of other countries, while developing unique qualities based on its own political, economic, social and cultural situations (Wang & Kao, 2010). In Taiwan, similar effort was undertaken to understand alternative written English forms adopted by local physicians when they wrote case presentations (Hung, Chen, & Tsai, 2012).

Although comparison of medical text written by authors with various cultural backgrounds was conducted before, previous studies have situated their discussion on identifying the difference in language use (Hung, Chen, & Tsai, 2012). In consulting a parallel corpus, this paper brings in the perspective of glocal literacy in order to highlight how local and global forces interact to shape Taiwanese students' writing. The following three questions are explored: (1) how does Taiwanese medical students' writing differ from case reports published in international journals, (2) how does parallel corpus help to explain the linguistic features in interns' medical writing, and (3) what framework for medical writing can be proposed to better instruct medical students

in Taiwan? The researchers hope to contribute in two ways. First, by considering both global and local resources, students may enhance the quality of their writing. Second, in providing local perspectives, university language and content teachers may gain insights on how to teach medical writing.

2. Literature reviews

2.1. Glocalization on medical writings

This section discusses how the pedagogical domain of glocalization has been explored by educators in medicine. The medical field has responded to the glocal phenomenon by comparing medical knowledge and practices to identify similar aspects across national borders and which are localized (Weiss, 2014), and reconsidering the idea of developing a global standard process in light of distinct cultural aspects of medical education (Hodges, Maniate, Martimianakis, Alsuwaidan, & Segouin, 2009). It was argued that while professional knowledge could be viewed as globally universal, professional practice might not due to the diversity of higher education and institutional systems found in specific locations around the world (Weiss, 2014). Having such a glocal perspective will help medical educators become aware of the parts of knowledge and practices that are globally and locally bound, thereby prioritize training objectives accordingly. In Taiwan, similar effort was undertaken to understand alternative forms of written Englishes adopted by local physicians when they wrote case presentations (Hung, Chen, & Tsai, 2012). The study identified two major areas, chronological order and the record of admission, where Taiwanese and international physician writers differed in linguistic expressions. According to the study, both areas are caused by the absence of a clear timeline (pp. 225-227). More specifically, while international writers almost always report specific dates, it was found that Taiwanese writers seldom mark the times of events such as admission and discharge, or they fail to indicate durations. Instead of using specific dates, Taiwanese physicians commonly use reference or transition words such as “then”, “therefore”, “eventually” and “finally” (p. 226). According to Hung et al. (2012), such alternative use suggests the influence of the instruction the students received in their English for General Purposes (EGP) classes.

Nevertheless, other studies indicate a native language influence. According to Arin (2003), with Chinese being a tenseless language, writers of the language often use content words like adverbs of time, such as *yijing* “already”, *ranhou* “after that” and *le* (an aspectual marker), instead of conjugating verbs according to tenses (Arin, 2003; Smith & Erbaugh, 2005; Xiao & McEnery, 2004). Such phenomenon suggests that students’ medical writing is influenced by both the global (English education) and local (their native language) factors.

2.2. Corpus linguistics

A corpus is a collection of natural occurring written or spoken texts which forms the basis of empirical linguistics. The processing of corpus data has enabled linguists to understand the use of specific words or phrases within the text. With the rapid development of informational technology, corpus linguistics has become an important analytical method in theoretical and applied areas from phonology, morphology, syntax, and semantics to language teaching and learning. Critics of such data-driven approach are primarily concerned with its bottom-up, or decontextualized nature. That is, without certain critical knowledge about the communicative setting (such as standard procedures followed by medical interns in a specific country, or protocol used for negotiation in a particular culture), it is difficult to interpret pragmatic meaning (Widdowson 1998, 2002). However, small, specialized corpora of EAP/ESP texts have yielded meaningful results to counter the criticism, by introduced top-down processing through tagging move structure patterns (Aston, 2002; Flowerdew, 2001, 2005).

In addition, recent studies on corpus linguistics have concentrated on two areas: 1) the development of useful tools to facilitate systematic data collection, computation, and analysis (Anthony, 2011; Scott, 2008), and 2) the examination of existing theories and applications in order to bring new insights into the sub-areas of linguistics (Biber, Conrad, & Reppen, 1998; Granger, Petch-Tyson, & Hung, 2002). Through a more efficient approach in obtaining systematic research results, corpus-based studies provide new evidence to amplify linguists’ perspectives.

2.3. Parallel corpus

A parallel corpus is a corpus that contains naturally occurring texts in one language and their translations in other languages. Parallel corpora, which can be either bilingual or multilingual, are important tools used in corpus linguistics and language teaching (Danielsson & Mahlberg, 2003; St. John, 2001). The corpora provide natural language samples which can be compared and analyzed for linguistic features and frequencies in two or more languages. Such a contrastive analysis can provide new insights into linguistic and cultural similarities and differences between languages. Studies have shown that the use of parallel corpora allows language learners (even beginner ones) to explore language patterns on their own, and to compare the target language with their mother tongue. Consequently, parallel corpora are increasingly being used in the language learning classroom (Danielsson & Mahlberg, 2003; St. John, 2001). The information provided by parallel corpora enables language teachers to determine frequent patterns of occurrence, design teaching materials and gain access to authentic data. The data are helpful for identifying universal and specific patterns to be included in course materials.

Increasingly, language students are encouraged to use parallel corpora on their own so that learners can experience language first hand and gain a better understanding of differences in meaning (St. John, 2001). The advantage of such parallel corpora approach is that students are asked not to simply follow grammatical rules presented in textbooks, but to discover the characteristics of real language through comparison and observation. Moreover, parallel corpora can be used in writing classes for understanding how learners' native language influences students' writing in the second language (Danielsson & Mahlberg, 2003).

3. Methodology

In light of the research purposes mentioned above, the present research is dedicated to discover the differences between experts' and students' texts in order to suggest what students need to learn. The findings will be used to improve students' medical writing. Creation of corpora, as well as the adoption of corpus-based approach will be essential to reach the goal efficiently.

3.1. The creation of corpus

The Corpus of English for Medical Purpose (CEMP) has been created for the current study. The students' texts were collected from the assignments of doctors-in-training course while the experts' texts were from the published case reports of medical professionals in *The New England Journal of Medicine*. There are 50 expert case reports (49,655 words) and 50 student case reports (9,829 words) respectively, adding up to 59,494 words in total.

In correspondence to the purpose of the present study and functions of analysis tools, the corpus of experts' texts were used as the reference text in order to contrast the differences between the two groups of texts.

3.2. Instrument for data analysis

CorpusTool of UAM (Universidad Autónoma de Madrid) was used to annotate the medical writings collected for the study. In total, 4,058 tokens were annotated according to the scheme including the related features of the moves and steps in the writings. In addition, the researchers analyzed the moves and steps with a significant difference ($p \leq 0.05$) focusing on the elements which require more attention and improvement in the process of professional medical writing.

3.3. Instrument for data comparison

The present study consulted findings from a contrastive analysis of the tense and voice in English and Chinese. The trilingual parallel corpus, CPEIC (Parallel Corpus of Spanish, English and Chinese), was created by a research team at a National Cheng Kung University in Taiwan (Lu & Lu, 2013). This corpus contains 1,256,901 English and 1,253,802 Chinese words with word alignment and POS-tagged information, which facilitates the comparison and contrast of the parallel expressions with same meanings.

To enrich various themes and textual types of the compiled corpus data, parallel data in three languages were collected from three sources: (a) The Bible, (b) Fairy tales, and (c) United Nations documents. The data for the (a) Bible section were downloaded from biblegateway.com (<http://www.biblegateway.com/>). The New International Version for

English and the Union Version for Chinese were chosen because these versions were closer to the contemporary language. The compiled data of (b) 13 fairy tales were downloaded from the International Children's Library (<http://en.childrenslibrary.org/>), partially retyped and manually sentence-aligned. Parallel data of (c) voting records (Section 65) were compiled from United Nations documents (<http://unbisnet.un.org/index.html>) related to humanitarian, cultural, economic, financial and social themes.

3.4. Moves and steps in medical notes

In this study, the researchers examined recurring patterns in the medical records and identified 4 moves: (1) chief complaint, (2) history of present illness, (3) record of patient visits, and (4) inter-hospital patient transfer.

Move 1, chief complaint, contains no sub steps. The move consists of the first sentence of each expert and student text, and describes 1) the age and gender of the patient and 2) the symptoms and reasons for admission.

In Move 2, which reports history of present illness, two steps were identified: (2-1) development of illness, and (2-2) related patient information. Step 2-1 aims to describe the development of the illness that is either the chief complaint or the root cause which leads to the chief complaint. Step 2-2, which describes related information, includes three sub-steps: (2-2-1) family history, (2-2-2) the patient's medical history, and (2-2-3) lifestyle.

In Move 3, record of patient visits, four steps were identified: (Step 3-1) record of visits, (step 3-2) hospitalization and treatment in the hospital or elsewhere, (step 3-3) subsequent hospitalization and re-treatment, and (step 3-4) test result. Step 3-1 includes 3 sub-steps: (3-1-1) record of past and current visit, (3-1-2) doctor's initial observation and diagnosis, (3-1-3) doctor's prescription, advice, and patient reaction. The third and last step is further divided into 2 sub-steps: (3-1-3-1) doctor's prescription and advice, and (3-1-3-2) patient reaction. Step 3-2 consists of 2 sub-steps: (3-2-1) treatment procedure, and (3-2-2) treatment result. Step 3-3 includes 2 sub-steps: (3-3-1) re-treatment procedure, and (3-3-2) re-treatment result. Step 3-4 also consists of 2 sub-steps: (3-4-1) physical examination, and (3-4-2) lab findings. Move 4, inter-hospital

patient transfer, has no sub-steps.

4. Results and discussion

According to the result of χ^2 test, the moves and steps that display statistical differences between experts and students are presented in Table 1. The results indicate significant differences between two groups in Steps 2-2, 2-2-1, 2-2-2, 2-2-3, 3-1-2, 3-2, 3-2-1, 3-4-1 ($p=0.00$), Move 1, 4 and Steps 3-1-3, 3-1-3-1, 3-2-2, 3-4, 3-4-2 ($p<0.01$), and Step 3-1-3-2 ($p< 0.05$).

Table 1. Number of writers in each group for the move and steps that reach significant differences

Move	Step			Experts	Students	P value
1				50	42	0.006**
	2-2			50	23	0.00***
		2-2-1		33	0	0.00***
		2-2-2		39	13	0.00***
		2-2-3		47	15	0.00***
		3-1-2		32	6	0.00***
		3-1-3		36	18	0.001**
			3-1-3-1	33	16	0.001**
			3-1-3-2	17	9	0.011*
	3-2			46	26	0.00***
		3-2-1		44	22	0.00***
		3-2-2		27	11	0.002**
	3-4			50	42	0.006**
		3-4-1		49	24	0.00***
		3-4-2		50	39	0.001**
4				35	46	0.009**
* $p<.05$; ** $p<.01$; *** $p=.00$						

To facilitate discussion, the researchers identified moves and steps that show a difference in usage frequency larger than 30%. That is, the following discussion focuses on linguistic features used by more experts than students by at least 1/3. These linguistic

features are categorized into three major aspects: voice, tense, and grammatical subject.

Table 2 summarizes the move and steps with major differences (greater than 30%) between the two groups, their respective linguistic features, as well as the number and percentage of uses found for each move/step. The moves and steps that do not exceed 30% differences in frequency are not discussed in this study. Move 4 is not discussed in this paper because, in both experts' and students' writing samples, the move is very similar in sentence structure and verb usage. The move almost always contains only one sentence structure as *The patient / He / She was admitted / referred to this hospital / our ward / (name of a clinical department)*.

Table 2. The linguistic features and number of uses that exceed 30% difference for each move/step

Move/ Step	Linguistic features	Experts	Students	
1	Chief complaint	(voice) passive	50(100%)	9(21%)
		(tense) past	49(100%)	23(52%)
2-2-1	Family history	(tense) past perfect	18(43%)	0(0%)
		(subject) others	42(100%)	0(0%)
2-2-2	Patient's medical history	(tense) past perfect	26(36%)	0(0%)
2-2-3	Lifestyle	(tense) past perfect	39(31%)	0(0%)
3-1-2	Doctor's initial observation & diagnosis	(subject) patient	33(75%)	1(20%)
		(voice) active	42(95%)	3(60%)
3-1-3-1	Doctor's prescription & advice	(voice) passive	70(94%)	14(60%)
		(subject) medication/treatment	54(73%)	0(0%)
3-2-1	Treatment procedure	(voice) passive	203(99%)	19(54%)
		(subject) medications/treatment	93(89%)	18(51%)
3-4-1	Physical examination	(voice) active	408(96%)	29(66%)

In the following, Section 4.1 discusses the difference in voice form found in Move 1, Steps 3-1-2, 3-2-1, 3-3-1 and 3-4-1 whereas Section 4.2 examines tense difference found in Move 1, and Steps 2-2-1 to 2-2-3, and Section 4.3 looks at the difference in grammatical subjects found in Steps 2-2-1, 3-1-2, 3-1-3-1, and 3-2-1. Finally, Section 4.4 examines the

relationships between grammatical subjects and voices. Furthermore, where findings from the parallel corpus CPEIC are applicable, the discussion between students' and experts' writings is first discussed, and then related findings from CPEIC are explored.

4.1. Voice difference

In Table 2, the analysis indicates major differences in the frequency of voice form. In Move 1, all experts used passive voices (100%), whereas the students use more active voice (79%) than passive ones (21%). The corpus shows that experts used past participles such as *admitted/referred/transferred/taken* (E1) in their passive forms. It was also found that students used active voice even when the passive forms were needed. As indicated in S1.1, where the student wrote "He hospitalized in our chest ward," the passive voice should have been used: "He was hospitalized..." Although sometimes students would use the same sentence pattern as the one used by the experts, the verbs found in students' writings tend to be more informal or conversational (e.g. *seen, told*, as in S1.2). When the active voice was used by students, they either used the construct "*the patient has + symptoms*" or "*the patient has the history of + illness*" (S1.3).

E1: A 2-day-old boy was admitted to the special care nursery of this hospital because of hypotonia.

S1.1: He hospitalized in our chest ward two weeks ago with complaint of acute dyspnea due to COPD with AE and discharge on 11/22.

S1.2: A 46-year-old woman was seen in the orthopedic oncology clinic of this hospital because of pain in the right hip and leg.

S1.3: The 54-year-old man had history of hypopharyngeal cancer s/p operation s/p complete chemotherapy and radiotherapy more than half a year w...

Students' tendency for using active forms, as observed in Move 1, is consistent with the findings in the sub-parallel corpus CPEIC (fairy tales), which shows that in translating English sentences that are expressed in the passive voice, only 34% of the equivalent Chinese sentences retains the passive form. This finding from CPEIC helps explain why the Taiwanese medical students in our corpus used more active voice in Move 1. Regarding the target voice form, both CEMP and CPEIC point to the need for students to

learn to use passive voice when writing chief complaints.

The voice difference is also found in Move 3. In the expert corpus, the active voice is found in Steps 3-1-2 and 3-4-1, whereas the passive voice is found in Steps 3-1-3-1 and 3-2-1. In general, the active voice was used when experts describe the patients' conditions, and the passive voice was used when describing prescription and treatment. In this move, students also used the active voice when the patient is the subject of the sentence (Steps 3-1-3-1 and 3-2-1), whereas the passive voice was used when the symptom was the grammatical subject (Steps 3-1-2 and 3-4-1). The relation of the subject and the voice form between the two groups will be elaborated in Section 4.4.

4.2. Tense difference

Regarding tense differences (Table 2), in Move 1, 100% of experts used past tenses, comparing to only 52% use of students. The reasons could be that students made an error in writing (as shown in Example 1 below); students were describing what they were seeing (Example 2); students were recording the illness the patient had (Example 3). Different from the experts' uniformed opening sentences of Move 1, students differed in content and format, thus resulting in the tense difference.

1. He is admitted because of progressive dyspnea and yellowish sputum for 4 weeks.
2. This is a 3-day-old male infant with BBW 3296g, born by C/S due to placenta previa at 37+3 weeks GA to a 31 years old mother.
3. The patient has rheumatoid arthritis with regular medical control for several years.

The corpus analysis also showed a difference in the use of verb tenses with regards to Step 2-2. The following discussion focuses on the 3 sub-steps of Step 2-2, describing information such as family history, patient's medical history, and lifestyle. The difference between Steps 2-2-1 and 2-2-2 is that the former describes the medical condition of the patients' family, whereas the latter describes the medical history of the patients themselves. Step 2-2-3 describes the patient's lifestyle such as occupation or smoking habit. In the three sub-steps, experts used simple past and past perfect tenses. However,

students differed in their lack of past perfect sentences (0%).

Examples of experts' past perfect sentences are presented below (E2.1 to E2.3 for Steps 2-2-1 to 2-2-3 respectively):

E2.1: His mother had had a pacemaker, his father's health history was not known, and three siblings had depression.

E2.2 : The patient had had pyelonephritis and mononucleosis during childhood.

E2.3: The patient had always lived in northern New England.

The lack of past perfect use is consistent with the findings from the sub-CPEIC corpus (fairy tales), which show that, among corresponding Chinese sentences, more than 50% does not include any aspectual markers for the past perfect tenses used in the original English texts. As indicated in the following parallel sentences (1)-(3), there are no aspectual markers nor temporal adverbs found in the parallel Chinese expressions.

(1) before night had fallen

在夜晚來臨之前

zai yewan lailin zhiqian

on night come before

(2) I had been to the Fair

我在集市上

wo zai jishishang

I at fair

(3) But nobody had seen it.

但是誰都沒看見

danshi shei dou mei kanjian

but who all not see

The above examples show that where past perfect tenses were used in English, the Chinese translations do not contain any markers to differentiate between past simple and

past perfect tenses. The findings suggest that learning past perfect tense may be difficult for Taiwanese users of English. This type of allowance might be an example of the glocal perspective in pedagogy that educators should adopt. With this consideration, it may be of great value for students to be more familiar with and learn to use the past perfect tense in English writing, and thus able to fine-tune their language use to highlight the difference between recent and distant past in medical writing. The target forms for learning will be added in the framework in Section 5.

4.3. Subject difference

The third major difference was found in the grammatical subjects used by experts and students. For Step 2-2-1, family history, whereas many sentences were found in experts' corpus, students' corpus does not contain such information. There are two possible explanations for the difference: (1) the patient's family history was already recorded in earlier visits, or (2) the interns usually do not ask for the information. If it is the latter, students will need to be encouraged to learn to elicit such information and learn how to communicate with their patients in such matters.

In Step 3-1-2, doctor's initial observation and diagnosis, experts tended to use the patient as the grammatical subject (E3.1), whereas students were inclined to use symptoms as the subject (S3.1). However, in both Steps 3-1-3-1 and 3-2-1, doctor's prescription and advice, experts mostly used medication or treatment as the grammatical subject (E3.2, E3.3), while students used the patient as the subject (S3.2, S3.3).

E3.1: On examination the patient was an anxious-appearing young man.

S3.1: In initial survey, fever up to 40 degree with no apparent sputum or urine finding was found.

E3.2 : Intravenous clindamycin and oral quinine were administered.

S3.2: She took Kayexalate powder for previous hyperkalemia.

E3.3: A bolus of normal saline was given, followed by a continuous intravenous infusion, and a Foley catheter was inserted.

S3.3: He received rehabilitation program at XXX.

The fact that students used both the patients and symptoms as the grammatical subjects suggests that students were taught about such writing convention, but only some of them had acquired it. Thus, students need to learn to use the patient as the grammatical subject in documenting observation and diagnosis, and use medication or treatment as the subject when documenting prescription and advice. Specifically, when describing patient reaction and treatment result, students should learn from experts, and use sentences that begin with symptoms more frequently because symptom reduction often serves as a means to measure outcome.

4.4. The relationships between grammatical subjects and voices

A separate section is created here to discuss the relationship between grammatical subjects and voice forms. The relationship between grammatical subjects and voice forms found in medical writing in the current study is illustrated in Table 3. When the steps in Move 3 were analyzed, it was found that when “the patient” was the subject of the sentence, the active voice was usually used (e.g. Steps 3-1-2, 3-4-1 by experts and 3-1-3-1, 3-2-1 by students). In sentences where students used symptoms as the grammatical subject (e.g. Steps 3-1-2 and 3-4-1), students had the tendency to use passive voice with lexical verbs such as “BE + *noted/ found*.”

Table 3. Interaction between grammatical subjects and voice forms

Steps	Experts	Students
3-1-2 Doctor’s initial observation & diagnosis	Patient + active voice (describing patient condition)	Symptom + passive voice (noting or observing of symptoms)
3-1-3-1 Doctor’s prescription & advice	Medication/treatment + passive voice (treatment being administered)	Patient + active voice + medication/treatment (receiving a treatment)
3-2-1 Treatment procedure	Medication/treatment + passive voice (treatment being administered)	Patient + active voice + medication/treatment (receiving a treatment)
3-4-1 Physical examination	Patient + active voice (describing patient condition)	Symptom + passive voice (noting or observing of symptoms)

The comparison points to the sentence constructions Taiwanese students are likely to use and the alternative forms students can learn from experts. Because students tend to imitate the writing of their teachers, it can be assumed that sentences found in student writing are influenced by the local Taiwanese convention for medical writing. For instance, from Table 3, it is possible to conclude that students are more likely to use “the patient” as the grammatical subject in Steps 3-1-3-1 and 3-2-1, when they wrote about doctor’s prescription and advice, patient reaction, and treatment result. If students can learn the forms adopted by experts, they will have more rhetorical alternatives to choose from. The overall finding suggests that students mostly used the fixed pattern, such as the “BE + *noted/found*,” and points to the need to raise their awareness on the relationship between different subjects and voices, and to learn to use more subjects and alternative language expressions used by experts.

5. Suggested framework for medical writing instruction in Taiwan

The following framework summarizes the subjects, verbs, and sentence structures used by experts. The information can be used for medical writing instruction or for students’ self-study. Seven moves/steps, along with their respective target patterns and expressions, are highlighted in Table 4.

To begin with, in learning to write Move 1 (chief complaint), students should learn the sentence structure “*Patient*+ *was* + PP + *to this hospital* + *because of* + (illness),” and learn to use the past participle forms of the following verbs: *admitted* /*seen* /*referred* /*transferred* /*taken*.

For Steps 2-2-1 to 2-2-3 (family history, patient’s medical history and lifestyle), students are encouraged to use the past perfect tense when applicable so that the different time layers could be clarified in the patient’s medical history. In addition, since student data do not contain entries to family history (versus 42 occurrences in expert), this step should be highlighted in teaching.

For Steps 3-1-2, in describing the doctor’s initial observation and diagnosis of the patient, students can learn to use the sentence pattern “*The patient* + active voice” and verbs such as *was/appeared/had*. For Steps 3-1-3-1 and 3-2-1 (doctor’s prescription and advice, and treatment procedure), students should learn to use the sentence pattern “medication/treatment/abnormality + BE + PP.” For Step 3-4-1 students should use active voice more often, using sentence patterns such as “*The patient* + *had* _ symptom” or “symptoms + *was/were* + adjective.”

Table 4. The framework for medical writing instruction

Moves/Steps	Sentence pattern	Verbs
1 Chief complaint	patient+ was + PP + to this hospital + because of + (illness)	<i>admitted/seen/referred/transferred /taken</i>
	Ex. A 2-day-old boy was admitted to the special care nursery of this hospital because of hypotonia.	
2-2-1 Family history 2-2-2 Patient's medical history 2-2-3 Lifestyle	past or past perfect tense: patient + <i>had</i> or (<i>had</i> + PP) + (illness).	
	Ex. His mother had had a pacemaker.	
	Ex. His father's health history was not known, and three siblings had depression.	
3-1-2 Doctor's initial observation and diagnosis	patient + V (active voice)	<i>was/appeared/had</i>
	Ex. On examination the patient was an anxious-appearing young man.	
3-1-3-1 Doctor's prescription and advice	medication/treatment + BE + PP (passive voice)	<i>administered/begun/recommended/prescribed/given/added/increased/tapered</i>
	Ex. Intravenous clindamycin and oral quinine were administered.	
3-2-1 Treatment procedure	medication/treatment/abnormality + BE + PP (passive voice)	<i>administered/begun/given/discontinued</i>
	Ex. The lesion on the forehead, 2.5 cm by 2.2 cm, was excised by means of Mohs procedure; Ex. The oxygen saturation intermittently fell to 92 to 93% and oxygen was administered by nasal cannula at 1 to 2 liters per minute.	
3-4-1 Physical examination	1. Patient + <i>had</i> + symptom 2. Symptoms + <i>was/were</i> normal (active voice)	
	Ex. In addition to the bone pain, the patient had fatigue Ex. On examination, the breath sounds were normal, bowel sounds were present, and the abdomen was soft with diffuse, mild tenderness.	

6. Conclusions

In this study, medical writings of Taiwanese medical students and international physicians were analyzed and differences in their language uses identified. Then a parallel corpus was referenced in an attempt to understand L1 influence on students' writing. Finally, a framework was proposed for medical writing instruction and students' self-study. In the CEMP corpus compiled for this study, it was found that in writing about the chief complaint (Move 1), a difference exists in the voice form used by the two groups of writers: experts all used the passive voice, whereas students used both active and passive forms. Some students used the same sentence structure, with the passive voice, as the one adopted by experts. Some other students summarized the patients' major illnesses and used the active voice form. The difference in voice was also found in Move 3, which was due to the grammatical subjects used by both groups (elaborated in Section 4.4). In writing about the development of illness (Move 2), there is a difference in the tense used: It was found that experts used both simple past and past perfect tenses, but no past perfect tenses were found in students' writing. Finally, in writing about doctor's observations, treatment, and treatment results (Move 3), it was noted that experts and students tended to use different grammatical subjects, which, as shown in Section 4.4 (grammatical subjects and voice forms) affects the voice form adopted.

Regarding the above-mentioned differences between students' and experts' writing, the parallel corpus CPEIC helps explain why students seldom used the passive voice, except for the lexical verb "BE + *noted*", and never used the past perfect tense. With the input from the parallel corpus, the findings of this study reveal both the global and local influences on students' writing: The global force comes from students' English learning education, whereas the local influence comes from Mandarin Chinese.

The findings contribute to medical education by highlighting how the dual forces of the target and native languages shape students' medical writing. Given the global perspective, further research is recommended to investigate how to respond to this kind of local tendency. With the difference in mind, the present study proposes a framework for the sentence patterns (along with grammatical subjects and verbs to learn) for medical writing instruction and for students' self-study. It is hoped that the findings will provide an example of quality medical writing and contribute to pedagogy for teaching medical writing.

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