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Speech-like or written-like discourse? The language variation of English writing in traditional and CMC writing modes

(二)中、英文摘要及關鍵字**:**

　　網際網路的快速發展促成電腦媒介溝通在教育上漸漸普及。其同步與非同步之特徵被視為突破傳統式課堂教學的時空限制，在英語學習上尤其能提供學生多樣的語言練習機會。然而，在對於外語學習者面對網路寫作與傳統寫作語言變化的挑戰方面的研究則相當有限。本計畫嘗試深入地了解具中等英文寫作程度之大學生對於透過不同媒介形式之英語寫作中語言變化的認知、影響其寫作時語言的掌握與運用的因素及學習者所使用的學習策略。

　　本計畫採用量化與質化混合式之個案研究法：主要研究一門結合傳統式寫作、同步與非同步的電腦媒介溝通式寫作之選修英文寫作課程，21 名學生對於不同寫作模式下英語語言變化之察覺與其語言使用的呈現。資料收集包括訪談、問卷、學生線上議題評論寫作及傳統正式寫作等。資料分析針對學生在不同寫作模式下之句法複雜度進行 t-檢定。另外，訪談及問卷之分析則由其所共同呈現之主題進行比對與探究。

　　研究結果發現學生在線上議題評論寫作及期中考寫作的句法複雜度並無明顯差異；但與期末報告的句法複雜度則呈現明顯差異。另外學生對於線上議題評論寫作及傳統正式寫作的語言變化的察覺及認識則呈現相當差異：較多線上溝通經驗的學生對於不同寫作語言的變化察覺度較尚未有許多線上溝通學生的察覺度高。而教學介入方案有助於學生在對不同寫作風格的人稱、用語、與選字上在不同寫作語言使用的認識與掌握。

　　With the rapid development of Internet in the past decades, computer-mediated communication (CMC) has become widespread in education. Previous research has explored various issues of integrating CMC in traditional language classrooms. However, few studies have explored how EFL students meet the challenge from the language variation of English writing between traditional paper-based essays and posting in electronic forums. This study aimed to explore EFL college students' awareness of the language variation between essay writing and on-line forum writing, the factors influencing their awareness, and the strategies they used to cope with writing for different purposes.

　　The study adopted case study methodology to investigate an elective English writing course for college students in Taiwan, in which a Web-based conferencing tool was integrated as an alternative mode with traditional face-to-face class sessions. Data were gathered from questionnaires, a follow up interview and the 21 students' essays and their postings in the asynchronous on-line forum. The results showed that the students constructed similar syntactical complexity in both on-line forum and mid-term examination but used more complex sentence structures in their formal essay writing. Also, the students showed diverse degrees of awareness of the writing variation in two writing modes. The students with more experience of on-line communication tended to show clearer awareness than those with only formal writing knowledge and less on-line communication experience.　The special

designed instruction was also proved to effectively help the students to gain clear concepts of writing variation in both writing modes.

關鍵字: 電腦媒介溝通 (computer-mediated communication)、 英文寫作 (English writing)、 語言變化 (language variation)、 同步(synchronous)、 非同步(asynchronous)、電子語段 (electronic discourse)、 詞彙濃度 (lexical density)、語法複雜度(syntactical complexity)

(三) 報告內容:

Introduction

    With the rapid development of networked computers in the past decades, computer-mediated communication (CMC) has been widespread in education since its first implications of networked classrooms for teaching writing in the late 1980s (Herring, 1996). The synchronous (e.g. chat or *InterChange*[1]) or asynchronous (e.g. electronic mail or electronic forum) features of CMC have been credited to offer more equal opportunities for students to participate in class discussions as well as fewer physical boundaries and time limits than traditional face-to-face classroom learning (Kern, 1995; Lowrer, Koneman, Osman-Jouchoux, & Wilson, 1996; Partee, 1996; Warschauer, 1996).

    In light of second and foreign language (SL/FL) learning, the interaction among human beings via CMC surpasses the old paradigm in traditional computer-based instruction (CBI) programs, in which interaction occur between human beings and computers. The innovative paradigm shift has redefined the role of computer technology in language classrooms as a mediation to "provide possibilities for new interpersonal contacts and communicative engagement" (Kern, 1995, p. 457).   From theoretical perspectives of the Interactive Hypothesis and socio-cultural theory in second language acquisition, the situated interaction via CMC helps language learners obtain comprehensive input, construct language acquisition, and then enhance their cognitive development.   A variety of L2/FL studies have explored the integration of CMC in L2/FL education and the effect of CMC on language learning (Beauvois, 1998; Chun, 1994; Gonzales-Bueno, 1998; Gray & Stockwell, 1998; Kern, 1995; Leh, 1997; Liaw, 1998; Oliva & Pollastrini, 1995; Sotillo, 2000; Sullivan & Pratt, 1996; Warschauer, 1996).   These studies and theories have proved that by providing authentic and situated communication through networked computers appears to be promising especially for adult EFL learners in Taiwan, who can hardly find practice opportunities outside of their English classrooms in which class meetings are also limited (i.e. 100 minutes per week).

    One crucial issue revealed from the studies of CMC in L2/FL education lies in the unique linguistic features in electronic discourses via CMC for EFL students who are facing the language challenges to switch spoken and written language in different communication communities (Baron, 1998; Collot & Belmore, 1996; David & Brewer, 1997; Ruhe, 1998; Yates, 1996).   According to Murray (2000), "a speech community is a group of people who share norms of linguistic and nonlinguistic interaction but whose norms may be involving or may sites of struggle" (p. 399). The text-based CMC discourses exhibit unique characteristics between spoken and written language (Biesenbach-Lucas & Weasenforth, 2001; Murray, 2000; Yates, 1996), which differentiates the conversation-like writing and official paper-based

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[1] *InterChange* is a synchronous (real-time) electronic conferencing program.   According to Kern (1995), "*InterChange* [allows] participants instance access to all messages as they are generated by the group. Students and teacher sit at individual computer terminals linked together electronically" (p. 458)"

writing.　Even within CMC, the variation of language has been found to form specific speech communities in different modes (Sotillo, 2000).

Additionally, a great portion of EFL college students' first language development has been influenced by the experiences they gain via on-line chat, electronic mails, or other types of CMC in modern technology era.　While engaging in various writing tasks including traditional formal essay writing and writing for communication via networked computers, it remains unknown to what extent EFL college students' English writing are affected by the electronic culture from their knowledge out of the classroom settings or whether they are aware of the linguistic variation.　However, very limited studies have been conducted to explore EFL students' English learning experience in higher education associated with the variation of electronic literacy.　The purpose of the study attempted to gain an in-depth understanding EFL students' awareness of the writing variation between formal essay writing and on-line writing.　Also, the study attempted to further examine the effect of an instructional intervention on EFL students' awareness of identifying language variation in different writing modes and their strategies to cope with the writing variation. Three research questions are formed to address these issues.

1. Do EFL college students vary their writing between formal writing and on-line forum writing?

2. How are EFL college students aware of the language variation of English writing between formal essay writing and on-line forum writing?

3. What factors may contribute to the students' awareness of the writing variations between the two writing modes?

4. What writing strategies do EFL students employ to cope with their writing tasks between formal essay writing and on-line forum writing?

Before describing the methods of this study, a brief review of previous literature is presented in the following section.

Method

Setting, course design, and participants:

The study attempted to understand EFL college students' awareness of language variation in different writing modes, the effect of a pedagogical intervention on students' awareness of the writing variation, and their strategies to the writing challenges.　The study targeted an advanced elective English writing course entitled 'Web-based English Writing" was offered in Fall, 2005. The course, as other traditional English courses met once a week for 100 minutes each week in a regular classroom.　In addition to the weekly face-to-face

class meetings, the course also adopted one of the Web-based learning systems offered by the university, Blackboard®, as an alternative class delivery system. In the 18-week semester, the instructor, also the researcher, designed various classroom-based activities (e.g., small group discussions, pro-con debate, on-line chat) to help students engage in many collaborative English writing activities. To clearly differentiate the functions of face-to-face class meetings and the Web-based class delivery system, the class sessions mainly focused on students' learning on general English writing concepts and issue discussions retrieved from local hot issues on campus, in Taiwan or worldwide. Then, the students were required to continue the on-line forum discussions via Blackboard after class meetings. Each week, one or two students, as mediators, led the on-line discussion with initiating questions and facilitated the on-going discussions.

The participants of this study were 21 non-English majors taking this course. Since this was an advance English course, the students' academic status mixed with students from freshman to senior year: There were four seniors, 5 juniors, 6 sophomores, and 6 freshman students. Also, there were 13 male students and 7 female students. Their age ranged from 18 to 22 years old. All students majored in Science and technology related fields. Before taking this course, students had received at least 8-year official English training from their elementary, junior and high schools. Sophomores or students from higher academic levels had even been required to take at least two basic English courses in their freshman year. Those freshman students who were specially allowed to take this advanced English course due to their top English scores performed in a national-wide college entrance examination, comparing to other freshman peers.

Before taking this course, all participants had previous writing experience from their high school for college entrance examination or other English proficiency standardized tests (e.g. TOEFL, GRE). As for their experience of synchronous on-line writing, all participants were familiar with on-line systems, like MSN or BBS. But only 5 out of 21 students experienced on-line communication in English under informal occasions, like chatting with key-pals or with their peers on campus or out of the country. Therefore, this course was their first experience to write for communication in English in classroom setting.

Study design and the pedagogical intervention

To address the research questions, in the first half of the semester before mid-term examination, the instructor did not intentionally lead her students to identify the writing variation. The course mainly focused on increasing the participants' practical experience of communication through on-line forum discussions and on basic writing problems (e.g. verb tenses, verb forms, sentence structures, and connecting words). Hence, the students intensively engaged in the on-line forum discussions on different topics. They were only required to write a reflection on a movie.

After the mid-term examination and the first questionnaire, the instructor began to

introduce the major difference between formal writing and on-line writing. A series of specially designed instruction lasted for 3 weeks were provided to teach students identify the difference between writing for formal essays and on-line writing. The content of the instruction was mainly based on the first questionnaire and the major difference between formal writing listed from the textbook "*Writing Clearly*" by Lane & Lange (1999) and "Academic Writing for Graduate students" by Swales and Feak (1994, 2004). Also, the students explored the structure in formal writing revealed from a textbook, "*College Writing: From paragraph to essay*" by Zemach & Rumisek (2003). Although the instruction at this stage focused on helping students explore language, styles, and structures of formal essay writings, the students continued their on-line forum discussion until 16th weeks. To evaluate the students' understanding toward forma essay writings, they were required to submit a term paper on any topic that had been discussed through on-line discussions.

Data collection and analysis

Three major data sources were collected during the data collection semester, namely, two questionnaires, formal interviews, and students' writing work. First, two questionnaires were distributed during the data collection semester. The first questionnaire, administrated immediately after mid-term examination, was to gain the students' technical problems and experience in using the Web-based class delivery system and to retrieve the participants' background experiences in English writing and preliminary knowledge of English variation. The second questionnaire, administrated in the last week, was specifically to understand how the students reflected their understanding of writing variation for different purposes in their final reports and on-line discussion.

Second, a formal group interviews was conducted one week after the students submitted the first questionnaire. The major focus was to gain an in-depth understanding of students' awareness of writing for mid-term examination and writing for on-line discussions. The students voluntarily chose if they accepted the interview individually or in groups. The interviews lasted for 30 minutes in average. They were conducted in Chinese and tape-recorded. The interview contents were summarized by the researcher and two research assistants.

The last data source was the participants' writing work from formal writing assignments and weekly online forum writing.   During the data collection semester, the students were asked to write two major formal writing assignments: mid-term examination and a term paper.

The questionnaire and interview data were analyzed qualitatively by synthesizing the themes emerged from the difference sources. The writing work was thematically organized and analyzed by total word numbers, type-token ration, T-unit, and total clauses. Two raters coded the data. Inter-rater agreement was 83%. The disagreement was coded by third coder until a agreement was reached. The T-unit and total clauses were then analyzed through pair t-test to see if the difference was significant.

Results and discussion

The study results were reported as follows based on the research questions.

Research Question 1: Do EFL college students vary their writing between formal writing and on-line forum writing?

Examining the syntactic complexity between on-line writing forum and formal essay writing, various paired samples t-test were conducted to show if the participants structured more complex sentences in formal writing than in on-line writing. Table 1 shows t-test results of the T-unit length of five randomly selected thematic online forum writing and that of mid-term and the T-length of those forum writing and that of final examinations, respectively. As Table 1 shows, only the T-unit length in Topic "Study English abroad", which was an on-line debate, shows significant difference from that of mid-term examination. However, all forum writing shows significant different from that of final paper.

CMC topic	Mean	SD	CMC vs. Midterm		CMC vs. final	
			T-test	P-value	T-test	P-value
5 nouns	11.90	1.99	-1.818	0.084	-3.491*	0.002
Study En. abroad	11.58	2.92	-2.288*	0.034	-3.204*	0.005
Hero	12.31	4.17	-0.945	0.358	-2.430*	0.027
High-tech	11.79	2.44	-1.364 *	0.203	-4.280**	0.002
Gender	11.98	2.03	-1.438	0.168	-4.468*	<0.001
Mid-term	12.973	2.318	----	----	-2.000	0.060

Table 1   T-unit length between online forum writing and formal writing

When examining the ratio of subordinate clauses within a T-unit under these thematic online writing and that in mid-term and final examination as Table 2 illustrates, all forum writings show no significant difference from that of mid-term examination. However, except "5 nouns" and "Study English abroad" show no significant difference from that of final examination, the rest forum writings apparently show significant difference from that of mid-term examination. In other words, the participants appeared to use more complex syntax in their final essay writing than in on-line writing and mid-term examination.

CMC topic	Mean	SD	CMC vs. Midterm		CMC vs. final	
			T-test	P-value	T-test	P-value

5 nouns	0.280	0.147	1.456	0.158	-0.635	0.533
Study En. abroad	0.254	0.223	0.440	0.665	-0.915	0.372
Hero	0.200	0.128	-0.141	0.889	-3.089*	0.007
High-tech	0.174	0.182	-0.548	0.596	-2.648*	0.027
Gender	0.186	0.139	-0.324	0.749	-3.203*	0.005
Mid-term	0.209	0.128	----	----	-2.136*	0.046
Table 2 Ratio of subordinate clauses and total T-unit between online forum writing and formal writing						

As the results revealed, the participants structured different syntactic complexity in their online forum writing, mid-term examination, and final essay writing. It is found that the participants applied similar syntax patterns in their on-line writing and mid-term examination, which appeared to be quite different from that of final essay. When examining the ratio of subordinate clauses in a T-unit, it is found that although the ratios of Topics "5 nouns" and "Study English Abroad" show no significant difference from that of final examination, Topic "5 nouns" was the first forum discussion, the students might apply formal writing styles they learned before. As for Topic "Study English abroad" was a debate oriented on-line activity. The discussion orientation differed from other reflective on-line discussion. It seems that the participants adapted quite formal writing styles under this topic, which were similar to their formal writing essays. It is noticeable that the students did not vary their syntactic complexity in regular on-line writing and mid-term examination but showed significant difference from that in final examination, especially from the t-rest between two last on-line writing and final examination. The results may suggest that the pedagogical intervention helped the students aware of the different writing styles between forum and formal essay writing.

Research Question 2: How are EFL college students aware of the language variation of English writing between formal essay writing and on-line forum writing?

Before the pedagogical intervention, the participants showed quite diverse perceptions of the writing variation between their mid-term examination writing and on-line forum writing before receiving a specific instruction of writing styles between formal essay writing and writing for communication (right after mid-term examination).   Only 25% students indicated that two writing modes were quite different; 25% students were totally unaware of the difference, and 50% students indicated that there was a light difference between the two writing modes but the difference was quite minimal. Interestingly, those who indicated no difference between two writing modes were freshman and sophomore students. Apparently,

students at higher academic years appeared to be more aware of the differences between two writing modes than those at lower academic years. However, for those who were aware of difference, the base of their major comparison lied in time limits, topics, grading system, essay structures, the writing length and cohesion, and writing attitudes toward the two writing modes.

However, when examining the type/token ratios (TTR) between students writing in mid-term examination and on-line forum discussion, it is found that the TTR of mid-term examination is 0.19 (1369/6889) whereas the TTR of two sets of postings on the same topics that the students discussed on-line after mid-term examination is 0.04 (275/6755). The quite different lexical density suggested that the students were actually aware of the formality between two writing genres.

After the instruction intervention, the participants showed clearer concepts of the two writing modes. Seventy-four percent of the students claimed that they began to be aware of the difference of word choice in both writing modes; that is, they tended to use more formal words in their term paper but use colloquial words or pay less attention to the nature of words in on-line writing. Two students reported that they did not differentiate the word choice because they used formal words in both writing modes.

Research Question 3: What factors may contribute to the students' awareness of the writing variations between the two writing modes?

As mentioned in Question One, the students from higher academic years seemed to show more awareness of the writing variation between the two writing modes than those from lower academic years. In other words, most sophomores and freshman students did not differentiate their writing in both writing mode in the first half of the semester. Two reasons retrieved from the questionnaires and interviews may explain the different awareness of writing variation between students with more academic experience and those with less academic experience. The first reason is that on-line chat in Chinese (e.g. MSN and BBS) has been a common activity for college students in their spare time. With more experience in college, the elder students accordingly accumulated more writing experience in on-line settings than those just were more aware of the difference between two writing modes. While engaging in on-line writing in English, they could easily associated the unique writing format they experienced from those in their mother language. Freshman students, in contrast, had much less experience in on-line chat in high school because of the intensive preparation of the college entrance examination. Consequently, they were not aware of the difference between two writing modes both in English. Additionally, their fresh memory of formal writing preparation resulted in their more formal writing styles in on-line chat than those in elder students.

The second reason is that some elder students began to prepare TOEFL writing test and GRE test. From the preparation and their experience in on-line chat, they were more aware of

the different writing styles in both modes than those students from lower academic years. From the interview and questionnaires, they showed more concrete concepts of differentiating colloquial words in formal writing (e.g. awesome, change) and attempted to shift colloquial (informal) words into more formal words in their mid-term examination (e.g. change vs. alter). Also, they attempted to search different sentence patterns in formal essay writings to improve the quality.

However, the more consistent can clearer concepts about the different writing modes can be found after the instruction intervention provided in the second half of the semester. Apparently, a concrete and clear instruction actually helped the students be aware of the writing variation. In general, all participants showed their clear awareness of the language variation in terms of the word choice, grammar, pronouns, and essay structures. They could also clearly identify two types of writing styles in a small test of formal essay writing and informal on-line postings (Appendix B).

In sum, the students' background experience in both writing styles and the instructional intervention helped EFL students be aware of the writing variation in both writing modes.

Research Question 4: What writing strategies do EFL students employ to cope with their writing tasks between formal essay writing and on-line forum writing?

As mentioned in the first research question, the students showed diverse perceptions of the writing variation between their mid-term examination writing and on-line forum writing before receiving a specific instruction of writing styles between formal essay writing and writing for communication (right after mid-term examination). The 25% students who were aware of the different writing variation between two writing modes mainly emphasized the communicative function of their on-line writing. They paid no attention to the word choice, grammatical correctness, person pronouns, and essay structures. However, in their mid-term examination, they purposely avoided colloquial language or repetition words. They checked grammatical correctness, varied different sentence structures, outlined the essay structure, and employed indefinite pronouns (e.g. people, someone), plural first person pronoun (we), or third person pronoun (he, she, or they). In contrast, the 75% students who were unaware of slightly aware of the different writing variations in both modes had more serious attitude toward on-line writing than the mentioned above 25% students. They did not purposely differentiate their writing in online forum or the mid-term examination. They avoided using difficult or ambiguous words in both writing to avoid miscommunication. By writing on-line postings in word processing program first to check grammatical errors, they concerned any incorrectness or inappropriateness shown in both on-line and mid-term examination writing because they both were exhibited in the class wide on-line environment[2]. Also, due to their

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[2] The mid-term examination was also exhibited in the same on-line class delivery system.

serious attitude toward the on-line writing, they avoided uncertain sentence structure or ambiguous words in their writing. Furthermore, since they were not aware of the person pronouns in both writings, they made no difference in both writing.

After the instruction and their experience in writing the term paper, most students showed more clearly different writing strategies in both writing modes. These strategies can be discussions from the following aspects: word choice, grammar and editing, person pronouns, and essay structures. First, 78% students claimed that they used more colloquial words in their on-line writing but more formal words in their final term paper. Some strategies for word choice were reported as follows.

(1) Two students reported that they carefully select words what they defined as formal words from dictionary. Then, they checked the examples under each word and chose the one fitting to the word context.

(2) Most students reported they intuitively select formal words in their final term paper. For example, X1 reported in the second questionnaire, "*BB (Blackboard) writing is more casual. The word like 'poor' should be fine. But I use poverty in my essay. I think it is better.*"

(3) The 78% students reported that they tended to find the simplest words in their on-line writing so others could easily comprehend the text meaning without dictionary consultation.

(4) One student from the 22% students who did not differentiate their word choice reported that she carefully selected words for both writing. To ensure the words fitting to the context, she consulted Chinese-English dictionary first. Then, she checked the word from English-Chinese dictionary to ensure the real meaning and usage of the word.

Second, 61% students reported their prudent attitude toward the grammatical problems in their formal writing, like to vary sentence patterns or double check grammatical errors with word processing software. However, they became relaxed in their on-ling writing; that is, they posted their thoughts without checking their grammatical errors and add emoticons (e.g. ☹). In addition to check their grammatical problems in Word®, they also checked the completeness of a sentence, including the major components in a sentence and check common writing errors they learned from in-class sessions.

Third, since all students were aware of the person pronouns in their final term paper, they avoided using second person pronoun (53%) but they used first person pronoun or third person pronoun. One student varied the person pronouns in his essay to increase the readability of his essay. Others avoided personal address in their writing. However, they either paid no attention to person pronoun in their on-line writing or employed first person pronoun to share personal experience or comments on the issue discussed.

Finally, because the in-class sessions in the second half of the semester focused on the structure of formal writing, the students intentionally followed the essay outline that they had

drafted. They emphasized the legitimate format of an essay based on the textbook. Also, they checked the cohesion and flows of their ideas among paragraphs. However, the nature of on-line writing to comment on a specific topic from previous postings or to initiate personal reflection allowed much freer writing structure than that of formal essay writing. Hence, they applied no specific strategies in the structure of their on-line writing but followed the outline of the final paper and paid attention to the cohesion and flows among paragraphs.

Conclusion

The application of CMC in language learning provides promising opportunities for students to engage in meaningful and authentic learning context. However, the text-based CMC communication challenges second language learners' knowledge of writing variation in different writing contexts. The study employed a case study methodology to explore EFL students' awareness of the language variation in different writing modes, the factors influencing their awareness, and the strategies they used to cope with different writing modes. The study results found that the EFL students showed little writing variation in their on-line forum writing and formal writing before the intervention but the difference of the syntactic complexity between on-line writing and that of final paper increased. Also, their concepts of writing variation in both formal essay and on-line forum writing became clearer after the pedagogical intervention. The students with higher academic status appeared to be more aware of the writing variation at the beginning than those from lower academic status. The study also proved that a specially designed instruction helped EFL learners gain clear and concrete concepts about the writing variation in both modes. The results may suggest that EFL educators could provide structured instruction before their students first explored to different writing modes. Their earlier awareness may help them vary their writing to fit into the different contexts. Although on-line writing allowed both formal and informal genres, some students still expected to make the difference to attract their readers' attention to reflect what they posted. After all, on-line forum discussion required much time and high engagement. Impersonal or too formal text may retard discussion flow or even draw no attention in the on-line community. Hence, EFL educators may design an appropriate instruction including the special language features and structures among various contexts. Thus, this may help EFL students gain concrete language knowledge in writing variation for various purposes, especially when they have or will be influenced by the popular "e-culture" in their daily life.

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(四) 計畫成果自評：

　　本計畫與原計畫大致相符，然而在語言變化的深入探討上(如詞彙濃度、用字選擇、，則因為樣本數太少，無法達成統計上有效的檢定，改採質化分析與探討。又因為本研究牽涉相當多句法學的觀念，在徵求研究助理以及助理的專業協助，則有相當的困難度。因此，雖然本計畫助理具有很好的英文程度，但對於深入分析句法則較為生澀，其分析結果亦不盡理想，預定分析時程因此延誤，但其研究結果仍大致達成原預計目標。

　　本計畫的初步成果發表在American Association of Applied Linguistic 2006年年度大會上(另案申請出席國際會議)。會中許多與會學者對於計畫構想相當有興趣，並要求提供教學上建議。本研究主要針對學生對於不同寫作語言的察覺度與其因素之探討，則已獲得Language Learning & Technology2007年special issue之初步審查通過，將於近期內提供全文進行審查。本人相信除了上述部份有機會刊登在SSCI期刊上，本計畫的資料如能再以更深入的方式分析，其結果可投稿於其它國際性期刊。