Web–Based English Writing Courses for Graduate Students

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INTRODUCTION

As globalization and rapid development of science and technology has brought huge impact on today's world, it is important for non-English speaking countries such as Taiwan, Republic of China, to actively participate in the international community through communication in the international language, English. In higher education, dissemination of research achievements through publication of international journals has been a common degree requirement, the practice in public research-oriented universities being the noticeable example. However, graduate students who have such needs are often unprepared to demonstrate acceptable academic writing abilities in English. To facilitate effective access to research information and to promote national academic excellence through international publications, it is essential to promote writing instruction of English for Academic Purposes (EAP). Meanwhile, Web-based environments provide a viable choice of delivery of EAP courses and the computer-mediated communication tools help formation of the student body as virtual organizations as they learn with one another.

The current project targets at promoting graduate students' academic English writing performance via digital learning in higher education contexts of Taiwan. The research builds upon the most updated EAP research and practices in English-speaking countries as well as the development of natural language processing (NLP), and constructs Web-based writing courses that develop students' knowledge and skills for writing publishable conference and research articles in two academic areas: computer science and English teaching.

Recently, research and teaching practices of English for Academic Purposes (EAP) have prospered with focuses on theoretical premises, methodological approaches, and pedagogical issues including curriculum design, materials development, and assessment (e.g., Flowerdew, 2002; Hyland, 2002; Jordan, 1997; Kuo, 2002; Swales, 1990, 2004; Swales & Feak, 2004). Instead of basing digital content only on EAP teaching experiences, our rationale of selecting digital content is not intuitive or subjective to any instructor in the field as previous works. Unique in this project is our basis of the content scope: systematic analyses of academic journal articles with the design of pedagogically sound learning tasks for writing research articles. The analysis and design were both assisted by advanced NLP tools. To achieve the goals we set, tasks in four major components have been accomplished:

1. Corpus compilation and text analyses as the foundation of digital content
2. Development of advanced natural language processing (NLP) tools to enhance digital learning of English writing
3. Construction of the Web-based EAP learning environment, which is enhanced by communication tools in order to deliver the courses to graduate students

4.   Assessment of digital learning on English writing to show the effectiveness of the project

The communication tools are believed to prepare our graduate students for the future as they may more intensively collaborate with their colleagues in academic circles via the tools while working at different locations. Such working styles enhanced by computer-mediated communication tools are common in virtual organizations (DeSanctis & Monge, 1998).

BACKGROUND

Distinctive in this project is the basis of our EAP digital content on systematic analysis of research articles (RAs) in two academic fields: computer science (CS) and applied linguistics (AL). To explore empirically the linguistic features and information structures of RA, we compiled and analyzed a representative corpus of journal articles in the two fields. To illustrate, three major journals of computer science were selected as the sources of sample texts: *IEEE Transactions on Computers, IEEE Transactions on Pattern Analysis and Machine Intelligence,* and *Computational Linguistics*. 120 texts in total ranging from 1996 to 2005 were chosen. Corpus analysis was performed to identify important rhetorical moves in each section of the journal articles [Abstract-Introduction-Method-Result-Discussion (Conclusion included as 'discussion')]. A move, according to Santos (1996), is a communicative unit that serves the major communicative purpose of the genre. The textual unit can be one to several sentences in a research article. The following example illustrates a "conclusion" rhetorical move based on our coding scheme:

//CC// We believe that these results, as well as the methodology, ***can*** *be further exploited to guide the training of individual classifiers and coordination of multiple classifiers.*

The first C (Conclusion) represents where the move appears. The second C means it is a "Conclusion" move (see *Table 1* for a sample of the scheme). Similar coding was done by previous scholars (e.g., Bhatia, 1993; Hopkins & Dudley-Evans, 1988; Swales, 1990; Thompson, 1993). We have identified: (1) major moves in each section of RA, (2) common patterns of moves in each section, and (3) the organization of moves throughout the whole articles.

Move tagging of all sample texts can serve not only automatic analysis of move patterns but also the retrieval of all cases of a certain move via concordance. Automatic analysis can help us identify common move patterns in each section, which are in turn used in learning materials. Furthermore, a great many phraseological patterns associated with various discourse functions in each section of RA were identified and hand-tagged in the corpus (see *Table 2*). Lexical bundles (such as *on the other hand*) as well as verb-noun collocations (Gledhill, 2000) from the two corpora with all frequencies were computed first and screened by researchers.

MAIN FOCUS

In the past, computerized corpus analysis had centered on the lexico-grammatical patterning of text. Very little has been done on functional and rhetorical levels. The linguistic tagging functions of existing software may have wide pedagogical applications. Anthony and Lashkia (2003) proposed the use of human annotation and the machine learning approach to create a system called *Mover*, which could offer an analytical move model for assisting abstract writing and reading. However, the approach is limited as it requires substantial human efforts with a low average precision rate, and the method may not be extended to all sections in RAs.

To save manual efforts in hand tagging on sentences or phrases (i.e., the seed corpus), a bootstrapping approach may promise to gradually expand these annotations to all sentences in a very large corpus with raw, untagged RAs. The feasibility of bootstrapping hinges on the notion of feature redundancy, a situation where there is often evidence to indicate that the given can be classified to a certain category. In our case, this means that there is more than one phrase in a sentence that indicates the move of the sentence. For instance, the presence of the phrase *we present* in a sentence of the abstract strongly indicates a PURPOSE move. If we happen to tag some sentences [e.g., examples (1) through (3)] containing *we present* as PURPOSE in the seed corpus, we can then look for other features (e.g., *in this paper*) that occur in all sentences with *we present* in the untagged corpus to discover the evidence of a PURPOSE move.

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