A Course in Best Practices in Scientific Writing and Oral Presentation in English for Chinese Graduate Students in Engineering and the Life Sciences

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Abstract

It is well recognized in China that, for the professional advancement of its graduate students in the upcoming decades, mastery of writing and oral presentation of their work in English is a necessity. Thus, for the past four years we have been developing and running a course in scientific writing and oral presentation in English at Shanghai Jiao Tong University (SJTU), one of the premier institutions of higher education in China. For the first years, the course was offered to a highly select group of primarily biomedical engineering, mostly PhD, graduate students, the field in which the two principals of the course – one Chinese professor and one U.S. professor – hold their academic appointments. In the most recent offering of the course, the student population was expanded greatly to include almost 200 MS and PhD students from many of the Schools at SJTU. In this 2018 offering a large faculty team was established to provide tutorials to groups of roughly 12 students to supplement the lecture component delivered by the U.S. professor. Student and faculty reviews of the course have been mostly positive and many important lessons have been learnt through the experience. The most critical of these lessons are being incorporated into a revised plan for the course when it is offered next in 2019. It is felt that our experience should be of interest to others contemplating the challenges of preparing non-native English speakers for the engineering profession in this twenty-first century. In the paper we share our methodology of teaching and detail the major challenges faced in this project.

Introduction

The effective training of scientists and engineers is an essential need of every modern society. Without an ample supply of talented well-trained such professionals no 21st century economy can be expected to prosper. With its vast population and mature system of higher education China is positioned particularly well to meet this need. While training in mathematics, science, engineering and design are vital components of an engineer's or scientist's training, it is widely recognized that the ability of these professionals to communicate well both in written and oral forms is essential for a successful career. The fact that English has emerged as the *de facto* international language of science and engineering has thus made mastery of technical writing and oral presentation in English a vital skill for scientists and engineers of all countries. Here we describe a program that we have instituted at an elite Chinese university to provide a large number of its graduate students with such a training.

History

Four years ago, the two authors of this paper initiated a course, primarily for PhD students in the School of Biomedical Engineering at Shanghai Jiao Tong University (SJTU) in scientific writing and oral presentation. The initial cohort of students in the course were selected because of their interest in improving their written and oral presentation performance and their current mastery of the English language. A series of lectures were developed and given to the students:

Lecture one:	Organization of a scientific paper
Lecture two:	Writing style
Lecture three:	Presentation and good use of figures, tables, movie clips and statistics
Lecture four:	Writing clearly and concisely, use of writing tools, vocabulary, sentence and paragraph construction
Lecture five:	Submission of a manuscript for publication, citations, plagiarism
Lecture six:	Awareness of the reader
Lecture seven:	Oral presentations
Lecture eight:	Publishing in a high impact journal

The lectures were given in English and supplemented with office hours. All students in the class were required to work with the course instructors one-on-one to improve a manuscript currently under preparation. As these were relatively advanced PhD students they had completed research projects that were in a position for publication, making it possible for a course instructor to help each student prepare a manuscript. In this way, the general principles laid out in the lectures were given authenticity in a practical real setting. The lessons learned through this trial run permitted the course organizers to refine the course for the next offering when it was targeted to somewhat less advanced graduate students.

For the second offering students were also selected who were reasonably conversant in spoken English but who were largely earlier in their research careers. Over subsequent years, the course was run with a greater number of students, and with students coming from other PhD programs (Agriculture, Chemical Engineering, Life Science, Pharmacy and Systems Bioscience) at SJTU and with a loosening of the proficiency in spoken English criterion for inclusion. In addition, more emphasis was placed on oral presentations with each student in the course being required to deliver a conference-length talk in English. Following the presentation, the student received feedback privately on what he or she did well and where improvement was needed. Because of the perceived need for and success of the course, the graduate school at SJTU was keen to expand it to cover yet more of its students. Thus, during these first years of its offering, the course organizers were continually innovating to make the course suit the needs of a student body more diverse in terms of graduate program and ability in spoken English.

In 2018 there was a massive upscaling of the student population to almost 200, including many students from multiple graduate degree programs at SJTU. To accomplish this new challenge some major changes in the structure of the course became necessary which will be described next.

The course in 2018

The lecture component of the course was largely retained with the lectures given, as in prior years, by a Professor of Biomedical Engineering from Northwestern University. To accommodate such a large number of students, three offerings of the lectures were needed. SJTU has two campuses and two of the offerings were given on its larger Minhang campus with one offering given on its smaller Xuhui campus. All three offerings of the lectures and all other components of the course were given in July during the SJTU summer term. The professor giving the lectures scheduled office hours but they were rarely utilized by the students in the

class. This was probably because the students felt more comfortable in approaching their course tutor (see below) with questions. Where there was one-to-one interaction between the lecturing professor and students took place either immediately before or immediately after a lecture.

To provide a small group environment for learning and to give an opportunity for all students to have their questions addressed fully, we organized tutorials in which approximately 12 students worked with a junior SJTU faculty member with experience in writing scientific papers in English (Figure 1). To ensure consistency in teaching across the different tutorial groups an SJTU Professor of Biomedical Engineering, a co-Director of the course who had obtained her doctoral degree at the University of Oxford and who has many years of experience publishing scientific papers in English, oversaw and monitored the material covered in tutorials. A Chinese language version of *The Elements of Style* by William Strunk, Jr. and E.B. White [1] was used as a textbook for the tutorials. Different tutors adopted somewhat different approaches in their tutorials, seeking to match the needs of their enrollees while remaining bound by the curriculum. At the conclusion of the course a meeting was held in which the course organizers and the tutors discussed best practices. This analysis of the strengths and weaknesses of the tutorials and their integration with the lectures provided extremely valuable information which we plan to use in 2019 to provide an improved learning environment for all students.

Figure 1: Meeting of the two course principals (right) with a group of course tutors to coordinate tutorial content and style.

Some tutorial groups chose to use exemplar published papers to illustrate points raised in the lectures, pointing out instances where good and bad practices were employed. This provided the students with very concrete examples of best practices. Moreover, as the tutorials grouped students according to their degree programs, it was possible to select articles that were of direct relevance to each group, something that could not be done as easily in the lectures as the students in this case spanned multiple programs. It also became clear from the feedback session that the lecture component of the course might be reconstituted so that it could serve the needs of all students better. Specifically, we determined that across the three course offerings, it would make most sense to target at least one set of lectures to students who enter the course with moderate to poor ability in spoken English. As we plan for this offering to take place on SJTU's Minhang campus, there is the logistical challenge of having SJTU Xuhui campus students needing this offering to have to commute to the Minhang campus. This logistical challenge was considered manageable as SJTU runs a regular shuttle between its two campuses.

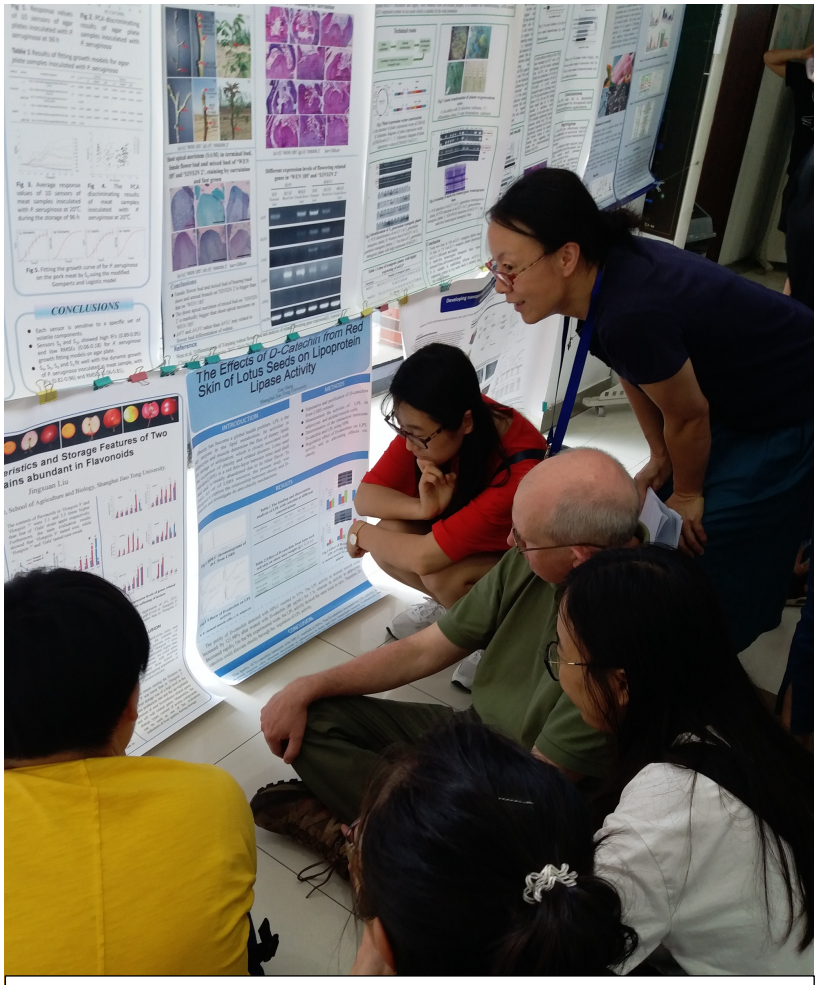

Figure 2: A course instructor interacting with Minhang Campus students at a concluding poster session.

With almost 200 students enrolled, it became impossible to give the students the opportunity to make individual oral presentations or work one-on-one with the lecturing professor with individual manuscripts, as we had done in past years. Instead we chose to have student prepared poster sessions to conclude all three course offerings. Added to the lecture component of the course was a section on preparing posters for a scientific meeting, which included poster design, awareness of the audience and so forth. At the concluding poster sessions, the tutors and course organizers went from poster to poster interacting with the students and providing constructive feedback (Figure 2). The sessions concluded with awards being distributed for those judged to be the best posters. The students and the faculty participated in the judging. These sessions provided a most rewarding conclusion to the course for all concerned. Small gifts were given to the award winners to recognize their achievement (Figure 3). We propose to continue such events in future offerings of the course.

Figure 3: Best poster awardees of the Xuhui Campus posing with a course instructor and course tutors.

Lessons learned

Some of the lessons learned from the course offerings have been noted above, so here we focus on those lessons not mentioned previously.

Cultural differences between the classroom environment in China and the U.S. affect the dynamics of a lecture. In the U.S. one encourages students to ask questions in class or even to proffer their own opinions. Chinese students are unaccustomed to this and generally reticent to do so, especially when the lecture is given by a foreign visitor to whom they show great respect. By contrast, Chinese students are less taken aback should they be called upon cold to answer a question in class than would be the case for a student in a U.S. classroom. It is something to which they are accustomed. In summary, Chinese students seem much more respectful of their professors than do U.S. students and this governs their behavior in the classroom.

Another observation that is perhaps useful to those seeking to develop courses in China, particularly those aimed at increasing English language proficiency for some end, is that the

English and Chinese languages stem from very different writing traditions. Chinese comes from the Sino-Tibetan tradition while English follows from the Indo-European tradition. These two language families have significantly different approaches to sentence formation with the result that word for word translation of a sentence from Chinese into English will produce a confused product. Chinese sentences can be centered around the object of the sentence, while English sentences are centered around its subject. Making the students aware of this difference can help them to become better writers in English. Of course, there are many other subtle differences that need to be overcome and one must recognize that one course is insufficient to provide full professional mastery. Even native English speakers take many years to develop their voice.

It is clear that the human and monetary resources required to run a course like the one we do is significant. That SJTU is prepared to do this indicates the importance that it places on this need for its graduates. Once the course has entered a mature state and the university and course organizers are satisfied with its format it may be possible to utilize technology to reduce cost. At present we remain in the learning phase. We are very encouraged by the outcome of our first large enrollment offering but recognize that the course can improve.

Plans for 2019

As mentioned earlier, in 2019 we plan to reorganize the course offerings so that the content of the course matches better the needs of each offering's student enrollment. Specifically, we seek to match the course content to its student population's abilities in spoken and written English. The offering for students with less competence in English will contain more coverage of English language fundamentals while the offerings for students with greater competence will focus more on advanced topics. Nevertheless, no offering of this course is intended to be a course in teaching English to Chinese students. There are many other opportunities for SJTU students to develop this competency. The focus of our course is developing professional competency.

The student body at SJTU is massive and there is currently no plan to develop a similar course for its undergraduate students. Many of its graduate students remain unserved by a comparable course and expansion to this cohort seems like the next step. The university has a number of graduate professional schools (e.g., business, law, medicine) where professional competence in English oral and written communication are needed equally greatly. But, the foci of material for each discipline and for undergraduates would need to be customized to the needs of these different client populations. Some lessons could be drawn from our experience but we are unqualified at present to do more than to relate what has worked best in our educational setting.

Prior work in teaching professional writing in English for engineers and scientists

There have been a number of previous documents written detailing best practices for scientific writing in English. For the development of materials in our course we have made some use of [2-4].

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