

Teaching Graduate Professional English in Mechanical Engineering

—Practice makes perfect

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Abstract—The instructors should adjust their professional English teaching strategy, as the graduate students' English ability keeps increasing year by year. Generally, students are better at reading and writing, compared to listening and speaking, which is typical of Chinese students. Most students could only figure out some words in listening, and professional English reading and writing are still a big challenge, as they are used to CET-4 and CET-6 type writing. The author took in latest scientific robot information in teaching, and adopted new ways of practices for listening/speaking/reading/writing/ and final evaluation, which got along quite well with the students. The real practice was proved very helpful in professional English teaching.

Keywords—professional English; robot; video evaluation; practice

I. INTRODUCTION

The aim of graduate professional English teaching, is to improve their listening/speaking/reading/writing ability overall and to enable them communicate with international colleagues[1-2]. The basic reason that Chinese students are not so good at English is not being in an English language environment as those living in US or Britain.

English teachers have made various efforts on English teaching[3-6], based on which, this paper introduce the trial in professional English lesson performed in a 14 students' class.

II. KNOW YOUR ENEMY AND KNOW YOURSELF

Investigating the students' English capability is the first thing before lecture, so a questionnaire was required to fill in. The content deals with their ability about listening, speaking, reading and writing. As shown in Fig. 1, only 2 students out of 14 thought their Chinese, such as reading/writing, are good.

Most of the students had passed typical Chinese English exam CET4(College English Test-4) and CET6 College English Test-6 for certificates. Only one took IELTS (International English Language Testing System) required for studying abroad. No one had taken tests like TOEFL(The Test of English as a Foreign Language), TEM-8(Test for English Majors-Band 8), TEM-4(Test for English Majors-Band 4).

One student did not pass any of those exams. And most students got not very good grades in CET6, the majority grades lied between 60~65, as shown in Fig. 2.

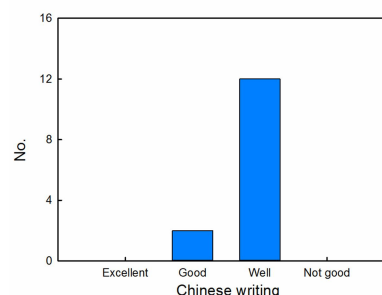


Fig. 1 Students' Chinese writing ability (totally 14 students in the class)

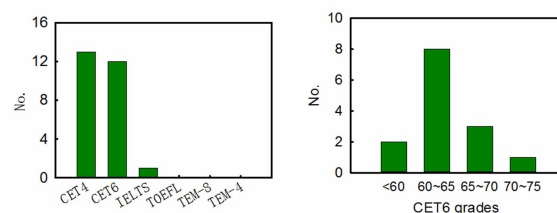


Fig. 2. (Left) Number of students which have taken specific English exams; (Right) CET6 grades distribution of the class.

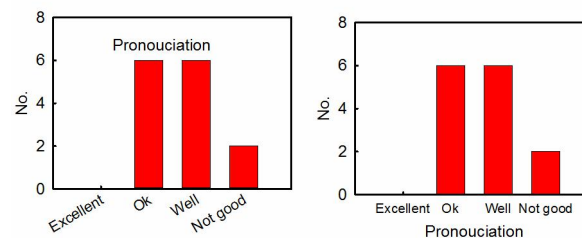


Fig. 3. (Left) Number of students who are weak in specific aspects; (Right) Students' pronunciation levels.

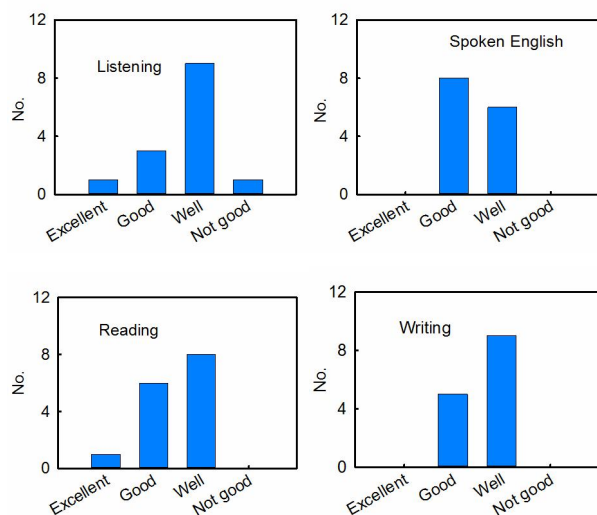


Fig. 4. Students' English listening/speaking/reading/writing abilities.

As shown in Fig. 3 and 4, most students have the wish to improve their English capability, especially in speaking and listening. As most students lived in China all the time, the main way that these students learn English is remembering English words, watching American TV Series and movies. But they used to notice the subtitles when they watch TV and movies, and never try to understand every bit of the video. As shown by the investigation (Fig. 1 to Fig. 4), there is still a lot to do to improve both their English and Chinese, which could be very promising and helpful.

III. TEACHING STRATEGIES IN CLASS

The classes were designed to lead the students into 'real' practice as much as possible. The class would last for 40 hours in the semester, 4 hours each time. In the first week, the teacher gives a lecture; the last week is for homework evaluation in class. In the rest weeks, one hour is used for the students to give presentations, 3 hours for teaching in each class.

A. Students' presentations-Speaking

The presentation was limited to 7-8 minutes because too long presentation would probably be boring, and take the reporter too much time to prepare. And a long report requirement would possibly result in reporter's searching others' online PPT readily, and introducing it hurriedly without devotion or passion, while the audience in class waiting impatiently and carelessly for the report ending. It is better that to design a professional and familiar presentation project for them in the first round. Therefore, the students were required to introduce their undergraduate thesis, which was just finished, tell others what work he/she did in that period-a project that they know well. For the rest round, the students could choose their own professional topic as they like.

This new arrangement is not an easy task for them at first. Introducing their work with professional English words is not a simple transformation because the expression ways in English and Chinese are so different, but as they were talking about their own work, it is easier for the audience with same-

background to understand the presentation even though the expression is not so exact, and communication between reporter and audience could be built easily.

The presentations were also hosted by students, giving them more opportunities to practice spoken English. From the second round, the presentation topics were selected freely, numerous modern topics were shown up, such as the autonomous cars, Tesla, and so on. Some students would introduce their thesis in detail.

B. Scientific video learning -Get to the bottom of the matter

Combined with the research focus of the Precision Engineering Department, the introduction videos with detailed narration of most famous robots in recent years (Fig. 5) were downloaded, such as the cockroach-like DASH robot, NASA's Spirit rover which now rests in peace on the surface of Mars, the famous BigDog Robot that Boston Dynamics invented. Those videos were scientific, funny and exciting, attracting the audience all the way through, especially the DASH robot which can run away undamaged after falls from heights of up to 28 m onto concrete. Printed narration scripts each with 300~400 words were prepared for scientific video learning exercise.



Fig. 5 (1) NASA's Spirit rover; (2) BigDog Robot of Boston Dynamics; (3) DASH robot of University of California, Berkeley; (4) Rollin' Justin of DLR (Deutsches Zentrum für Luft- und Raumfahrt e.V.) whom can make coffee.

The scripts were divided into paragraphs, with 5-6 blanks left in each paragraph for the students. The left words were selected tactfully, neither too easy, nor too challenging. A back-and-forth repeated listening/reading/writing strategy was implemented in the video studying:

- For the first time the video played, only some words could be figured out by the students. For understanding the video better, the script with blanks were handed out in class. Fifteen minutes were allowed to read through the script. The students would find out that they knew 80% of the words in the script, but could not recognize their spoken version. By listening 2~3 times, 90% of the blanks could be correctly filled in. Finally they would find out that, English listening is not so difficult. It is important to listen as much as possible, spell

correctly and understand words in the video, because many words have different meaning in different application. In English learning, it is necessary that one has to not only comprehend the word itself, but also its real applications in written and spoken sentences, which is 'disguised' than that on paper.

- When all the blanks had been filled, a translation from English to Chinese would be required, and discussion about the script in detail are performed, some phrases and sentences that could be misunderstood will be explained by lecture, ensuring students could comprehend the script precisely.
- In order to help the students to remember and deepen impression about the script that they listened, the print English script would be took back and its Chinese version would be hand out to students, whom are asked to translate the Chinese script back to English. It is not an easy task-more difficult than translating from English to Chinese. But the all students tried their best to write in the way of 'English writing'. Some can remember and use the beautiful words they learned just 10 minutes before. They will examine and learn from each other's translation when finished. At last the English version would go back to them for deepening the feeling about 'spoken' English and writing.

This back-and-forth repeated listening/reading/writing strategy is a totally new way of English learning for the students, the teaching trial proved that it is effective and well received.

C. Speed writing

Speed writing is another magic weapon working every time and all students benefited from this instrument. In this section, some latest science news without any narration would be played, for example, the rolling robot of Boston dynamics released in February 2017 which can lift, run, spin fast and steadily on only two wheels, and the hydrogel robot invented by MIT which can catch a fish safely and precisely, all from discussions in Wechat (Fig. 6). The students were required to write a short article in 15 minutes, which could be anything, deals with those amazing videos, the more the better. At the end they will check each others' writing.

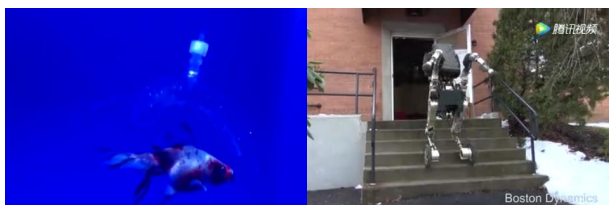


Fig. 6 (1) MIT's soft hydrogel robot catching a fish; (b) 'Handle', the Rolling Robot of Boston Dynamics rolling down steps safely.

The writing capability of the students would be improved by the training. At the beginning, only simple sentences can be written, but at the ending, they can write a nice short essay, occasionally with some elegant and native English words and style. They also could use the words from the video scripts mentioned above.

IV. FINAL EVALUATION

Full autonomy on the final evaluation was granted to the students. They were free to choose a topic, either introduction about their own research group, or an their own interesting professional design. A version about 800 Chinese words should be hand in, after passing instructor's preview, an equivalent English version as a video script is required according to the Chinese version. The students will prepare a video, dubbed it with their own voice and script.

The author encouraged the students many times to learn from the natural passion of western narrators, and their beautiful ways of expression.

Quite good homework videos made by the software 'love clip' were handed in, which were all carefully prepared obviously (Fig. 7). Some introduced their groups work, some introduced a mechanical design, both with texts and meaningful figures, some even added rhythmic background music. Some spoke slowly and leisurely, some were quite 'passionate' as English speakers. The audience were also devoted to their classmates' work.

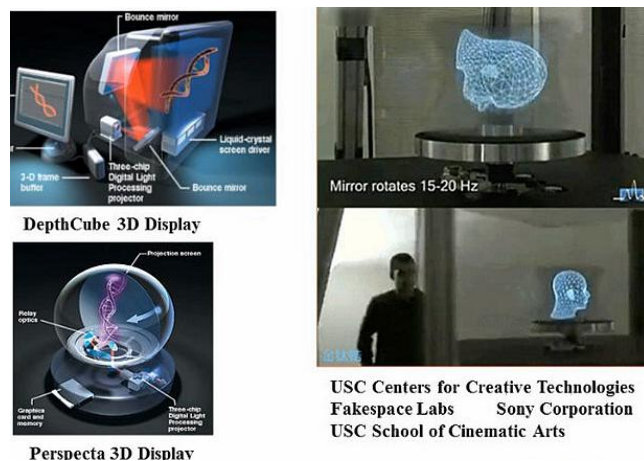


Fig. 7 Students' video talked about 3D TV which might need their holography technique

V. CONCLUSIONS

One thing worth to mention is the long class-hour, where it was not easy to keep students' attention for 4 hours, although various methods such as evaluation form, question bonus and so on, were applied to encourage their involvement in class. However, the video-learning and speed writing way for professional English teaching in the paper is a new trial, performed on only one class, and the first semester result shows a some satisfied effect. The response from the students shows they benefit a lot from the class, although it was too short for big improvement in a 40 hour professional English lesson, but it encourages them to keep improve their English skills.

ACKNOWLEDGMENT

The author was grateful to the financial support of College Students' Joint operation of Shanghai University, and the

support of all the members of graduate professional English class.

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