Consolidative ESP

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Abstract

There is an ever increasing demand from industry that engineers, especially those in the field of computer science, have a better command of English. This paper reports the pilot ESP teaching project in one of the biggest faculties of engineering in Japan. About 150 second-year students were given the weekly assignment of translating what they had learned in class about a programming language into English. The project was carried out by a team of specialists, both in the content area and language teaching, and implemented on CEAS, an e-learning platform which emphasizes the face-to-face lecture. The project proved to be successful as the test results in English and the programming language showed a strong correlation. The student perception of the demanding curriculum was also positive. Through trial and error in the course of one year, the ESP teaching curriculum for the first to third year students was developed. Keywords: ESP (English for Specific Purposes), programming language tutorial, teacher collaboration, e-learning

Background

There is a broad consensus in Japan that engineers should have a good command of English. This is especially true in the field of software engineering where English is the de-facto lingua franca, as not all technical documentation is translated into Japanese, since it is both cost-ineffective and time-consuming. Take the example of JAVA, one of the most commonly used programming languages (developed by Sun Microsystems). The company provides a JAVA tutorial for new users both online and in books. The third edition of the tutorial was published in January 2000 in book form. The Japanese translation, however, came out almost two years later in November 2001. This one example is enough to indicate that if you are unable to read technical documents in English, you will miss out on the newest available information which may be crucial for you to perform competently on the job.

In spite of the language proficiency expected by industry, Japanese undergraduate students in information science and science, engineering or agriculture majors do not have enough competency to use English at work. The average TOEIC score of these students is 397, which is the lowest score compared to students in other majors [1]. The Educational Testing Service, which runs TOEIC, suggests that a TOEIC score of 470, far beyond the current language ability of science and engineering students, is the threshold for using English for work [1]. The limited English proficiency among Japanese university students is somewhat justified, however, in that they are studying in Japan and do not need any foreign language to pursue their undergraduate study [2]. Nevertheless, every effort should be made to narrow the gap of language proficiency expected by industry and that possessed by the students.

Another problem with Japanese university students is that they hardly study outside the classroom. One recent survey conducted in one of the biggest private universities in Japan revealed that nearly 40% of the students in the Faculty of Engineering do not study at home, and some 30% spend only between 30 and 60

minutes per day studying at home [3]. These figures suggest that it is unrealistic to assume that the students would spend some time studying independently, let alone studying English. The university curriculum, especially the one for engineering students is already packed, and there is no room for any additional course which might lead students to study more.

The new faculty and a pilot ESP programme

Presently, an organizational reform is now underway at the Faculty of Engineering at Kansai University due to be completed in the academic year 2010. It is being divided into three more specialised facilities from 2007, and one of them decided to have English for Specific Purposes (ESP) education in the curriculum as the faculty realised that something must be done to overcome the problem of English proficiency of their students. ESP was set out to be one of the three key educational goals of the newly founded Faculty of Environmental and Urban Engineering.

It is not unusual for an engineering faculty to have some ESP components in the curriculum. What was innovative for Kansai University was that ESP teaching would be incorporated with compulsory or some other popular elective subjects from the very first semester for the first-year student to the sixth semester for the third-year student continuously. In other words, English is taught as part of the professional and technical education given in the faculty.

Although the new curriculum was to launch in the academic year of 2007, there was a lack of syllabi, teaching materials, and the know-how to run such courses on a grand scale in the faculty. Because of these circumstances, a pilot programme was established in ESP education in conjunction with two compulsory courses for second-year students. The first course in the first semester introduces the students to the JAVA programming language, and the more advanced course is given in the second semester. Both courses are taught by one of the authors (Dr. Fuyuki). Each course has an average student enrollment of 150 students each year, and as it is the first encounter with a programming language for the majority of the students, both courses have the reputation of being one of the most "severe" courses in the department.

As the courses themselves are heavily packed with JAVA content, the ESP course content was assigned as the out-of-class study. In other words, the students study about JAVA in class in their native language of Japanese, and review what they have learned in class in English. The ESP homework, as it is called, was assigned 20% of the final grade, and an additional 15% was allocated for the ESP examinations scheduled in the middle and at the end of the semester. In total, 35 out of 100 points were given to the ESP portion of the course, and this grading system was enough to tell the students that they had to take the ESP assignment seriously to be successful in the course.

Goals and objectives of the project

We set two goals and three objectives for the project. The distinction between goals and objectives is taken from Brown [4].

The first and foremost goal was to make our students study more. In addition, we would like them to develop study habits which are appropriate for university students. The second goal is to provide the students more exposure to English. Here, we would like to be more specific about the kinds of English they receive as input: we restricted the kind of text types to ones the students would encounter in their professional life, in other words, to technical documents, as we hoped that the students would be accustomed to the vocabulary and the rhetoric used in such documents, as opposed to those used in the popular magazines or newspapers.

The three objectives were chosen to consolidate the study of JAVA and English. First, the students were given a weekly assignment of ESP homework. In the homework, the students were to translate what they had learned in class in Japanese into English. As the process of translation requires good comprehension of the source text, the students had to review the textbook and the handout from the lecture before they translated. This objective was designed to achieve the first goal of developing good study habits. There was another reason why homework was allocated for the ESP assignment. The weekly face-to-face lecture was scheduled to be given by a content professor, and it was impossible to arrange for the English language instructors to team teach the class. A detailed account of the project's task-force is described below.

The second objective was to transform the students from language learners to language users. As stated above, apart from a few mandatory foreign language classes, undergraduate students in Japan do not need a foreign language to study or do research. However, that does not mean that they will not need to use English for their work. On the contrary, the demand for engineers who have a working command of English is ever increasing in Japan. In other words, it is not a question of "if" but rather "when" they will need English for their work. This means that when they need English, they will no longer at school where they can get support from the English teachers. In this respect, they have to be independent in their language use, regardless of their proficiency. However, it does not mean that there is nothing the language teacher can do. We can teach them, for example, how to use reference materials, such as dictionaries and online search engines or other resources on the Web when they are independent.

The third objective was that we would guide our students to the wealth of resources written in English available on the Web. Familiarising the students with those resources would certainly help the students if they were to learn more about JAVA by themselves, or to learn yet another programming language in the future. Also, we would emphasise that those technical documents were in fact not difficult at all once the students had sufficient knowledge in the field. Together with the second objective, the homework was designed so that it would be a dry run for the future English use by the students.

Teacher collaboration and e-learning

To run a project which had a strong interdisciplinary nature, a task-force was formed, comprised of two professors from the Faculty of Engineering and one professor in English linguistics from the Institute of Foreign Language Education and Research, a foreign language teaching department at Kansai University, along with one teaching assistant who is a PhD student specialising in ESP. (For convenience, in this paper the former two professors are referred to as "the Content Team" and the other two as "the Language Team.") Realistically, however, it was impossible for four people who belong to different departments to work together on a weekly basis for a period as long as a 15 week semester. In addition, as there were almost 150 students enrolled in each of the courses, it was impossible to run such a course with conventional methods of paper-based homework collection. To overcome the organisational, time, and class operational constraints, we turned to e-learning.

The e-learning system we used was not a conventional e-learning system which is intended either for distance or remote education or individual self-learning by providing learning materials for the learners to consume. Our system, the Web-based Coordinated Education Activation System, known as CEAS, was developed by the Fuyuki Laboratory at Kansai University. CEAS was designed to integrate the student's in-class learning and the learning done outside the classroom so that students can build an ideal learning habit which will help them to be more autonomous learners who can be responsible for their own study. The system is based on a tripartite cycle of learning: preparation for the class (1st phase); a classroom session or a lecture (2nd phase); and review activities (3rd phase). To be more specific, the teacher provides learning materials which prepare the students for the second phase a few days before the classroom session. After the classroom session, the teacher again provides learning materials which help the learners to review the content given and explained in the session. In addition, the e-

learning system has various modes of examination and questionnaires.

There were number of benefits of using CEAS in our project. First of all, it became possible to collect the weekly ESP homework from 150 students. The Language Team which was responsible for marking and analysing the homework could download the students' homework from CEAS by themselves. This contributed to having no time lag in sending data – or a bunch of papers – from one team to another. Having the output from the students in the form of digital data was also crucial in the project since very limited personnel resources were allocated to mark the homework. The scoring of the homework was partly automated by using various functions of Excel. The students' answers were also stored in a database, or a corpus, for future reference. There was yet another advantage of using CEAS in this project. Retrieving and submitting the homework via CEAS meant that the students had to access the Internet. In other words, we could be certain that they could go online, and provide the references which were available on the Web.

As this is an interdepartmental project, apart from a few meetings, almost all communication between the teachers was on email.

Project details

In this section, some details of our project are described.

Project timetable

As the ESP teaching was incorporated into the JAVA programming language course, the following timetable was put into practice (Table 1).

The reason the ESP homework was uploaded to CEAS on the day following the lecture was that we wanted the students to review the lecture not on the same day but rather during the next few days.

Translation assignment

The statements which were used for the ESP homework translation assignment were carefully chosen

Table 1. Weekly timetable.

Day of the week	Event	Responsible team
Wednesday	Lecture	Content Team
Thursday	ESP homework uploaded on CEAS	Content Team
Midnight, Saturday	Homework due	

Saturday to Tuesday	- Prepare the sample translation - Score and analyse the homework - Prepare the review material (PowerPoint slide) to be used in the next class session	Language Team
Wednesday	Review the ESP homework using the material prepared by the Language Team	Content Team

by the Content Team from the textbook (written in Japanese) based on the importance of the content, not on the grammatical or lexical importance of the statement. Initially, there were five translation tasks from Japanese into English and another three translation tasks from English into Japanese. After one semester, it proved too much for both the students and teachers, and from the second semester on, only three translation tasks from Japanese into English were given.

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As stated above, one of the objectives was to train the students to be independent in their future English use. However, we decided not to provide any reference materials written in English from which the students could find the words and phrases necessary for the translation during the first semester because we wanted to see how the students tackled the translation homework. In the second semester, the URLs for the selected pages of the JAVA tutorial were provided with the translation homework.

Assessment

Each course had three examinations: a midterm and a final on ESP as well as the final examination on the JAVA programming language. The proportion of the score was as follows: 50% for the final examination on JAVA; 15% for attendance and preparation of the assignment (in Japanese); 20% for the ESP homework; and 15% for the ESP examinations.

Results

The students' performance in the first semester was disappointing. The biggest reason for this was that the majority of the students were not able to comprehend why they had to do English homework in a JAVA language course. As a result, they just did homework for the sake of the credit they had to earn. Another reason was that they did not understand what was expected from them. The survey carried out at the end of the semester revealed that the students went for quick fixes such as free translation websites and submitted the nonsensical or rather cryptic sentences without hesitation.

The ESP examinations were, in consequence, disastrous. This was due in large part to the way the examination questions were provided. It was proposed by one of the teachers that the students should memorise the sample translations presented by the Language Team as they did not have enough proficiency to do their own translation and the examinations tested whether the students could reproduce the sample translations. It proved highly unpopular among the students and it led to further demotivation.

After the first semester, a number of issues were identified by the task-force. First, the English proficiency of the students' was quite low on average. There were frequent errors, as elementary as subject-verb agreement, for example. As this project was not to raise the proficiency level of the students', we reached the conclusion that those with limited proficiency should be introduced to a commercial e-learning system the university subscribed to which was available for the students at no fee. Second, we were, by this time, fully aware that the students did not know that they should consult the technical documents to find not only the right words for the context but the right usage of the word, such as collocation. As mentioned above, we decided that we should provide the URLs from the JAVA tutorial at the Sun Microsystems website. It was certainly most authentic, since it was "from the source", or published by the developer of the language. Also, it was written very carefully with limited vocabulary, presumably with the international audience in mind. In addition, it did not require any previous knowledge or experience in programming. Another issue of improvement was to reduce the volume of the ESP homework as discussed above. We also agreed that we should give explicit guidance on how to find the right words and / or phrases with the help of dictionaries and online resources, namely Google. Finally, we concluded that we should revise the form of the ESP examinations from the reproduction of the sample translations to something more appropriate to

assess the students' capability of using the resources and the comprehension of the JAVA language.

The improvements discussed above turned out to be successful. At the end of the second semester, the scores of the two ESP examinations and the JAVA final examination were compared to see if there was any correlation between the two. If there was a correlation between them, it would lead us to believe that though originally studied in Japanese, reviewing the content subject in English consolidates the understanding of the content subject, in this case, the JAVA programming language. Much to our surprise, a strong correlation (r=0.87) between them was observed.

Moreover, nearly 60% of the students concluded that they had acquired knowledge in JAVA through ESP study. One of the questions in the term-end questionnaire asked what kind of knowledge or skills you had gained by doing the ESP homework. English was the most anticipated answer. However, less than one fifth of the students thought they only learned English by doing the ESP homework. Surprisingly, a third of the students found that they learned more about the JAVA programming language by reviewing it in English.

Conclusions

From the pilot ESP teaching project in the year 2006 we concluded the following: First, giving review tasks which required the students to read and write in English proved helpful in consolidating the content subject knowledge studied in Japanese. Second, providing explicit and step-by-step guidance on how to use reference materials such as dictionaries and Google helped students to translate. Third, collaboration between the content professors and the English teaching specialists was indispensable to the ESP teaching. Also, the e-learning system, CEAS, helped to run the project efficiently.
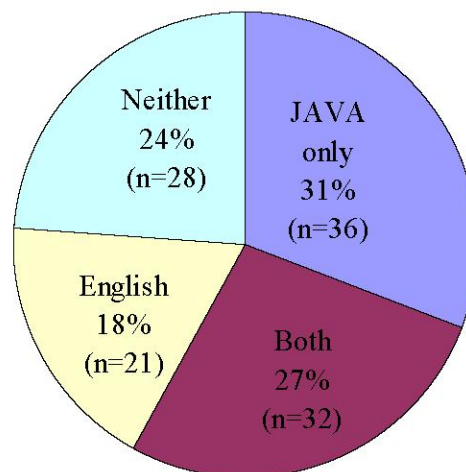

Figure 1. Kind of knowledge or skills acquired through the ESP homework (n=117).

ESP teaching: 2007 and beyond

Having had the successful outcome from the pilot project in 2006, the ESP teaching curriculum in the new Faculty of Environmental and Urban Engineering is now well underway. The project is now expanded to a wider audience from the first year to the third year. In a compulsory course in introductory computer science, the first year students are given the weekly ESP homework which focuses on the vocabulary in the field. The students are provided with the reference materials (mainly taken from Wikipedia or Wikibooks, both in the English version) where they have to find the answer for the questions given. The third year students, who have gone through the last year's ESP teaching, now listen to a podcast on the topic of the study (the universal modelling language), and have a weekly listening quiz. As a result, the ESP teaching at this faculty is now a continuum beginning from the first semester to the point the students start the laboratory studies at the fourth year.

Although being successful, there are some problems in our pilot project of last year and the current ESP teaching programme. First, we do not measure the students' language proficiency at the beginning of the course, as the language proficiency at the start of the course will be a variable which affects the outcome of the ESP teaching. Also, we have to find or develop human resources who can work in the Language Team in order to sustain the curriculum. Knowledge and skills required for an ESP teacher are somewhat different from the ordinary language teacher. You must be highly proficient in the language, to begin with. Also, you should be capable of analysing the texts used in a target discipline. For this

purpose, knowledge and skills in corpus linguistics is highly desirable. In addition, as you work closely with experts in other fields, you should be flexible in your work. The Graduate School of Foreign Language Education and Research, Kansai University, has a course on ESP which is still very unusual in Japan. We strongly hope to recruit talented individuals as part of our Language Team for sustainable ESP teaching.

Acknowledgement

References

[1] TOEIC Steering Committee, "TOEIC Test Data & Analysis," The Institute for International Business Communication, Tokyo 2006.
[2] T. Dudley-Evans and M. J. St John, *Developments in English for Specific Purposes.* Cambridge: Cambridge University Press, 1998.
[3] Kansai University Student Office, "Heisei 17 nendo Gakusei Seikatsu Jjittai Tyousa Houkokusho (Report of the 2005 Student Life Survey)," Kansai University, Suita, Osaka 2006.
[4] H. D. Brown, *Teaching by principles: An interactive approach to language pedagogy.* Upper Saddle River, NJ.: Prentice-Hall, 1994.

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