The Waseda University CELESE Program: A Large-Scale, Centralized ESP Program for Scientists and Engineers

アントニ　ローレンス

早稲田大学理工学術院英語教育センター　〒169-8555 東京都新宿区大久保 3-4-1
E-mail:　anthony@waseda.jp

概要

本論文では、2004 年度より開始された早稲田大学理工学術院英語教育センター(CELESE)の理工系学生向け英語プログラムにおける教育学的概念、背景、実施方法について概説する。初めに、日本で理工学に携わる人々が直面している課題について、次に ESP（特定目的のための英語教育）の最新理論に基づいた CELESE における理工系学生向け英語プログラムのデザイン、さらに学生評価とプログラム評価の仕組みについて説明する。最後にプログラムの今後の発展計画を述べ、他のアジアの教育機関で実施する場合に不可欠な条件について得られた示唆について述べる。

The Waseda University CELESE Program: A Large-Scale, Centralized ESP Program for Scientists and Engineers

Laurence ANTHONY

Waseda University, Faculty of Science and Engineering, Center for English Language Education
3-4-1 Okubo, Shinjuku-ku, Tokyo 169-8555, Japan
E-mail: anthony@waseda.jp

Abstract

This paper describes the rationale, background, and current implementation of the Waseda University Faculty of Science and Engineering English program that has been continually developed at the Center for English Language Education (CELESE) since 2004. First, I will explain the language challenges facing Japanese scientists and engineers that led to the creation of the program. I will then detail the program design with reference to current views on English for Specific Purposes (ESP) theory. Next, I will detail current student- and program-level evaluation procedures. Finally, I will report on future developments of the program and suggest key requirements for a successful implementation of the program at other institutions in Asia.

1. Introduction

Since the late 1990s, Japan has experienced a rapid acceleration of globalization and the need for English, especially in the area of science and engineering. One of the early indicators of this change was the appointment of Carlos Ghosn as the Chief Executive Officer (CEO) of Nissan Corporation in June 2001. Faced with a $20 billion debt at the company, Ghosn was able to turn this into a profit in just one year. Writing about his experiences at the company, Ghosn said, *"There were so few people in the company's Tokyo headquarters who could speak English... A problem like this affects the company as a whole, especially its ability to react swiftly, and it limits cross-functional work."* [1:163]. Following this trend, similar appointments have occurred at other companies, including Henry Wallace as CEO of Mazda Motor Corporation in 1996, Howard Stringer as CEO of Sony Corporation in 2005, and Craig G. Naylor as President and CEO of Nippon Sheet Glass Co. Ltd. in 2010 [2,3,4]. Japanese CEOs have also begun to see the need for a more globalized, English speaking workforce, as illustrated in a 2010 interview given by Hiroshi

Laurence ANTHONY, "The Waseda University CELESE Program: A Large-Scale, Centralized ESP Program for Scientists and Engineers"
日本英語教育学会編集委員会編集, pp.39-46, 早稲田大学情報教育研究所発行, 2010 年 1 月 31 日.
This proceedings compilation published by the Institute for Digital Enhancement of Cognitive Development, Waseda University.

Mikitani of Rakuten, in which he states that "Any executives who cannot speak English in two years' time will be fired" [5].

Japanese universities have traditionally been quite slow to respond to changes in industry. However, at the Faculty of Science and Engineering of Waseda University, the need to educate students to be truly globalized citizens was recognized in 2000. This led to the creation of a new *Center for English Language Education in Science and Engineering* (CELESE) in 2004 that was later renamed the *Center for English Language Education* in 2007. CELESE was given a mandate to create a new undergraduate English program for its 6500 undergraduate students that would foster students who could not only use English to study, research, discuss, and present the content of their specialist area of study, but also use English to discuss and resolve global issues in academia and the workplace [7]. The success of this program led to a new mandate for CELESE to create a graduate school English program, which is the first of its kind in Japan [8]. The complete CELESE program now serves all 10,000 students in the Faculty.

In this paper, I will first describe the current CELESE program with reference to the latest theories on English for Specific Purposes (ESP). Next, I will explain student- and program-level evaluation procedures, and finally, I will offer some suggestions for future development of the program and ways to implement it at other institutions in Asia. Due to space limitations, this paper will deal only with the undergraduate component of the program, however, it should be noted that many of the design issues explained below also apply to the graduate school program.

2. Design of the CELESE Program

The CELESE program is a state-of-the-art English for Specific Purposes (ESP) program. It adopts many of the foundational ESP design principles proposed by Dudley-Evans & St. John [8]. However, it is also strongly influenced by vocabulary learning principles suggested by Nation [9]. In addition, it incorporates novel ideas (at least in a Japanese context) including curriculum design principles, evaluation procedures, and teaching practices that allow a program-wide adoption of ESP to become a possibility.

ESP programs have traditionally been associated with product-oriented approaches to language teaching, as exemplified in the early ESP courses of the 1960s and 1970s, such as those described by Swales [10]. Indeed, many current ESP course materials available in Japan still follow this view, stressing the importance of specialist vocabulary, unique discourse patterns, and specific genres of a field.

However, in the CELESE program, greater emphasis is placed on learning processes, following the long-held view of Hutchinson and Waters [11], but regrettably forgotten by many later ESP practitioners. As Anthony [12] explains, graduates in science and engineering will be entering a workplace that is constantly changing. Knowledge acquired at university can become obsolete in just a few years, and there is an increasing chance that workers will be required to move to new sections, branches, and countries. In this environment, companies are placing increasing value on knowledge acquisition (learning) processes, as well as the ability to work in a team on collaborative projects in which ideas are communicated through discussion, debate, and negotiation [13,12].

To maintain a good balance between product-based learning, which is clearly necessary for students to master the language of their academic discipline, and process-based learning, which is necessary for success in both academia and the workplace, the CELESE program is designed along several continuum, as illustrated in Figure 1. The resulting program is shown in Figure 2.

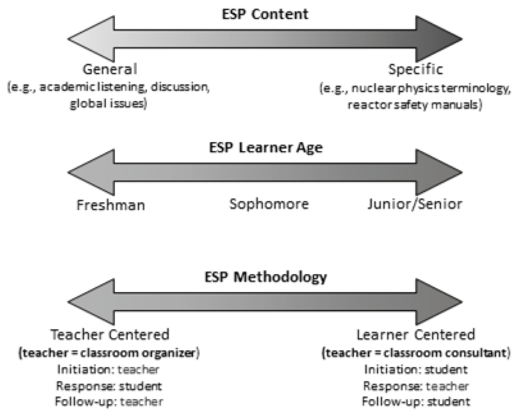

Figure 1. The ESP Continuum at CELESE

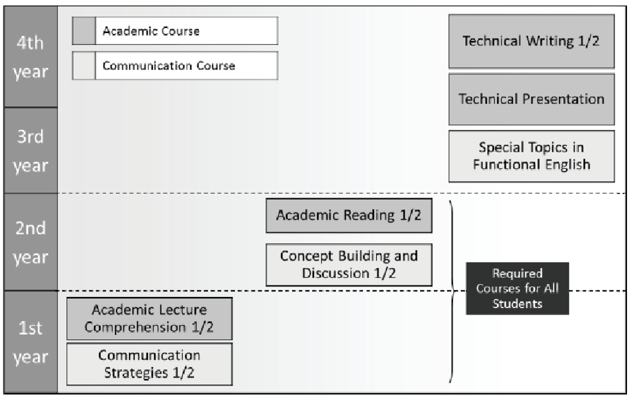

Figure 2. The CELESE ESP Program

In their first year of undergraduate study, students take two courses: *communication strategies* and *academic lecture comprehension*. These are two-semester, required courses that students take once per week for 90 minutes. On the ESP continuum shown in Figure 1, these can be considered 'general ESPl,' as students will require little knowledge of specialized-subject content, although topics covered in the courses are related to issues of general interest to scientists and engineers. Importantly, teachers also require little specialist-subject knowledge and can thus teach the courses using a traditional teacher-centered approach. It is important to note that around 85% of teachers are part-time faculty and most do not have science or engineering backgrounds. Nevertheless, in both courses, students are always encouraged to discuss ideas with their peers. For example, in the *communication strategies* course, students will watch videos of TV news reports from the US and then discuss the issues covered in the reports relating them to their own lives. In the *academic lecture comprehension* course, students will first watch more traditional academic lectures delivered by native speakers on topics such as language acquisition processes, data communications, and engineering disasters. Next, they will analyze and then discuss and debate the content of the lectures in a similar way to students attending college lectures in western countries.

In their second year of undergraduate study, students again take two required courses: *academic reading* and *concept building and discussion*. These are important in that they bridge the gap between the 'general ESP' courses of the first year and the 'specialized ESP' courses in the third and fourth year. As such, teachers are still required to guide students carefully through in-class tasks, but students are given more freedom in their choice of materials and their way to complete tasks. Also, because the content of the classes is still at the level of 'general science and engineering,' teachers can feel comfortable even if they do not have a science or engineering background, which is the usual case.

In *academic reading*, students acquire valuable academic reading strategies while studying university-style textbook materials that follow the logical structures students were exposed to in their first-year classes. These structures include chronology, process, cause-effect, and problem-solution, and all are expected to appear with high frequency in the students' graduation-research readings. For homework each week, students are required to locate their own high-interest reading materials from the Internet or library, and summarize and critically review these in the following class to a group of their peers.

In *concept building and discussion*, on the other hand, the emphasis is placed on oral communication. Students first work through a series of tasks that help them to develop the skills needed to explain methods, describe graphical data, and discuss the value and/or importance of findings. Then, the students carry out a series of projects in which these skills are utilized in a meaningful environment. The first is a group project in which the students select a high-interest (and often controversial) topic and use Internet resources to investigate more about it. Topics include the following: What were the causes of the Fukushima nuclear disaster? What is the best city to host the Olympics? Could the oil spill in the Gulf of Mexico be prevented? The second project is a group project in which students first learn how to design and use questionnaires, and then apply this knowledge in an investigation of their peers' opinions, such as their views on smoking, their use of smartphones, or their feelings about conservation. The third project is an individual project in which students design and carry out a more traditional science or engineering experiment that utilizes only household items. Topics here include measuring the time for different salt solutions to boil, measuring the impact of sleep on memorization techniques, and measuring the relationship between height and speed of walking. For all projects, students are required to write-up a formal report and present their findings as an oral presentation.

In their third and fourth year of undergraduate study, students are able to choose from three elective courses; *technical writing*, *technical presentation*, and *special topics in functional English*. *Technical writing* is a two-semester course in which students learn how to write a conference-level research paper using an in-class textbook and corpus-based materials and software. *Technical presentation* and *special topics in functional English,* on the other hand, are one-semester courses. In *technical presentation,* students learn how to give a 10-15 min conference-level technical presentation using slideware software, such as *Microsoft PowerPoint*. In *special topics in functional English*, students can develop specialized English skills in a variety of classes ranging from sound processing and pronunciation analysis to business English skills.

On the ESP continuum shown in Figure 1, the third year courses are clearly in the area of 'specialized ESP.' As a result, there is a further shift towards a learner-centered approach in the classroom. For example, in *technical writing*, students are encouraged to build their own corpora of technical papers and then use corpus-analysis techniques to analyze these texts to find characteristic features. Many of the teachers are not experts in science and engineering, but they have extensive experience in editing technical papers and can advise students on what features are likely to be the same or different across disciplines. With this knowledge, students can then consult their own corpora and craft a research paper with the appropriate format and style of their fields.

3. Evaluation of the CELESE Program

A critical component of any education program is the comprehensive evaluation of student progress as well as an evaluation of the program itself. At CELESE, student progress is monitored in two ways: 1) using internal criterion-referenced testing (CRT), and 2) using external normalized testing via the Test of English for International Communication (TOEIC).

The first and most important measurement tool is CRT. This is a critical component of the program because the majority of instructors are part-time faculty and thus have the potential to apply varying self-guided measurements of performance. In addition, students at CELESE are streamed (ability-grouped) based on their scores in the TOEIC proficiency test. As a result, without CRT, students are in danger of being graded overly harshly or overly gently based on their comparative performance with surrounding students.

CRT is implemented for each course as a detailed set of Can-Do statements and an accompanying syllabus and grading schema. Table 1 shows the list of Can-Do statements for *Technical Writing 1* taken by third and fourth year students, and Table 2 shows the grading schema needed to achieve an A+ grade (top grade) in the same course. Clearly, both the can-do statements and grading criteria are open to interpretation, but the guides are further supported by teacher-teacher discussions at the end of each academic year, where the grading of sample student papers is compared.

Table 1 Can-Do statements for *Technical Writing 1*

- understand the importance of English in the fields of science and engineering
- understand common problems associated with using technical vocabulary
- use effective strategies to learn technical vocabulary
- identify the audience, purpose, structure, style, and presentation of a technical text
- understand the structure of a typical technical research paper
- use micro and macro level reading strategies to understand research proposals and papers
- understand research journal "instructions for authors" sections
- write the title, introduction, methods, results, and discussion/conclusion sections of a research paper
- write simple and extended definitions
- explain methods and processes
- explain information in figures and tables
- know how to strengthen or weaken the interpretation of research finding through hedging
- understand the importance of references, citations, and avoidance of plagiarism
- follow common conventions for citing and referencing information in a research article

Table 1 Grading schema for A+ grade in *Technical Writing 1*

- Overall
  - Shows fluency in both language use and ideas.
- Mechanics
  - Follows the journal template (headings/presentation/layout)
  - Spell and grammar checked
- Citation/References
  - Cites all sources and references these correctly
  - Uses all appropriate and high level sources (at least one journal article)
- Paragraphs
  - Writes in paragraphs of over 3 sentences
  - Paragraphs include topic sentences
  - Paragraphs are linked with logical connectors
- Style
  - Shows good understanding of formal academic writing style (correct verb usage, no run on expressions, no slang, preciseness, no contractions, limited use of "I" "You", no direct questions)
- Grammar
  - Shows good understanding of tense/voice usage in different sections of a paper
  - Complex sentence structure is used
  - Discussions are hedged
  - Shows good understanding of article usage
- Organization
  - Titles: detailed and structured correctly
  - Introduction: discusses background/past research and the problems (with citations)
  - Methods: written in correct tense/voice; procedure is clear, search engines and sources or materials and procedures described
  - Results: describes main points in figures/tables
  - Discussion: discusses results with correct hedging

The second student performance measurement tool is TOEIC. This is less important than CRT but provides a valuable *external* measure of student progress that allows comparisons with students of other institutions inside and outside of Japan.

Students are required to take the TOEIC five times; once on entering the university and then once at the end of each academic year prior to graduation. Scores are relayed back to both students and their individual departments. Although TOEIC scores do not directly affect course grades, they are used by department professors when determining whether to accept a student into their third/fourth year research laboratory.

Program evaluation is currently carried out in three ways. First, students are asked to complete course survey forms, the results of which are given directly back to the course instructor. Second, students are asked to complete a program-level survey as part of the TOEIC. Third, program developments are discussed and evaluated at the English Management Committee, a faculty-wide administrative committee that determines long-term planning and personnel issues.

Feedback from both students and faculty is considered carefully and often has a direct impact on future plans at CELESE. It should be said, however, that since the start of the CELESE program, the response of both students and faculty has been extremely positive, especially in light of the fact that average CRT and TOEIC scores have both showed significant gains in each year of the program (see Fig. 3).

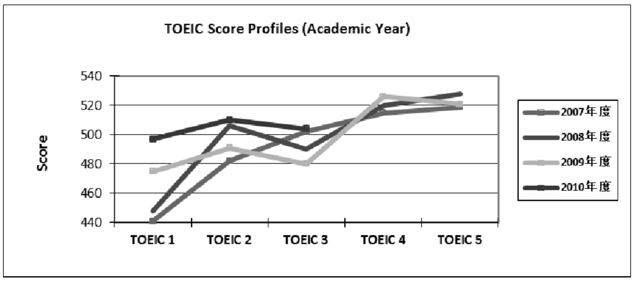

Figure 3. TOEIC Scores for the CELESE Program for 2007-2010

4. Future Development Plans

All curricula should be designed with mechanisms for implementing change based on evaluation and feedback from stakeholders. The CELESE program is no different, and student evaluations and faculty feedback has already led to numerous changes including a simplification of the CRT system to avoid excessive in-class, test, and homework grading, the introduction of simplified teaching materials to assist low-level students in *Academic Reading*, workshops to assist instructors in using corpus tools in *Technical Writing*, and a revision of the student streaming (ability grouping) procedure to allow very high-level students to participate in a specialized, fast-track version of the program.

Immediate future plans for the program include a complete rewrite of the first year *Communication Strategies* course to enable students to develop more practical communication skills that they would require when studying in an English university environment or attending an international conference. There are also plans to revise the *Academic Reading* course to incorporate more relevant reading materials that can be easily adapted for students of widely varying ability levels. In addition, there are plans to develop a new, intuitive corpus software for use in *Technical Writing* that can be used by both teachers and learners to semi-automatically identify characteristic features of writing at both the micro and macro level.

5. Conclusions

Many Japanese institutions have attempted to develop ESP courses that target the specific needs of scientists and engineers. However, it is often the case that funding restrictions, administrative limitations, and differing pedagogic views of faculty have resulted in these courses being isolated at the fringes of general English programs. Also, this problem is not restricted to Japan. Indeed, institutions throughout Asia face similar challenges when developing science and engineering English courses.

To ensure that all Asian scientists and engineers receive adequate English training that will enable them to perform on the world stage, institutions need to introduce a *program* of ESP courses that are well defined, carefully integrated, centrally administered, and intrinsically linked to the goals of the learners. Of course, such a program cannot be implemented without the full support of the full-time and part-time faculty who teach the courses, as well as the department and faculty heads that approve program funding. Therefore, a key element of a successful program is for it to be directed by a strong leader with the ability to clearly communicate the needs of the program to the various stakeholders, including students, part-time faculty, and perhaps most importantly faculty administration. Also, it is necessary to communicate in a language that is familiar to these stakeholders. In general this means the stakeholders' first language, but in the context of a science and engineering faculty it also means the language of science. For example, when the program requires additional budgeting, it is necessary to communicate this need using financial projections displayed using statistics software. Similarly, when additional personnel are required, the administration and teaching roles of current faculty need to be carefully listed and the costs/benefits of a new hire need to be specified quantitatively. Fortunately, if the requirements are in some way scientifically justified, administrative faculty are less likely to be negatively influenced by self-interests. Rather, they are likely to scientifically evaluate all competing petitions and approve those that are the best justified.

In this paper, I hope to have shown how ESP can be implemented at the program level. Considering the increasing needs for scientists and engineers to use English in their research and future careers, I hope it is also clear that similar programs are greatly needed at other institutions in Japan and the rest of Asia.

References

[1] Ghosn, C., Shift: Inside Nissan's Historic Revival. Crown Business, 2004.

[2] Mazda Motor Corporation, Available at: http://www.fundinguniverse.com/company-histories/Mazda-Motor-Corporation-Company-History.html.

[3] Sony Corporation of America: Senior Management. Available at: http://www.sony.com/SCA/bios/stringer.shtml

[4] NSG Group Names Former DuPont Exec Craig Naylor as President and CEO. Available at: http://www.usgnn.com/newsNSG20100415.htm.

[5] Toyokeizai Online,「三木谷浩史・楽天会長兼社長——英語ができない役員は 2 年後にクビにします (Any executives who cannot speak English in two years' time will be fired)」. Available at: http://www.toyokeizai.net/business/interview/detail/AC/810ee47297d49033c2a4b43a0a5216e0.

[6] Anthony, L., ESP at the center of program design. In K. Fukui, J. Noguchi, and N. Watanabe (Eds.) Towards ESP bilingualism (in Japanese). Osaka, Japan: Osaka University Press, pp. 18-35, 2009.

[7] 寺内 一,野口 ジュディー,笹島 茂,山内 ひさ子（編）,21 世紀の ESP—新しい ESP 理論の構築と実践, 大修館書店.

[8] Dudley-Evans, T., & St John, M. J., Developments in ESP: A multi-disciplinary approach. Cambridge: Cambridge University Press, 1998.

[9] Nation, I.S.P., Learning Vocabulary in Another Language. Cambridge: Cambridge University Press, 2001.

[10] Swales, J., Episodes in ESP : A source and reference book on the development of English for science and technology (1st ed.). New York: Pergamon Institute of English, 1985.

[11] Hutchinson, T., & Waters, A., English for specific purposes: A learning-centred approach. Cambridge, UK: Cambridge University Press, 1987.

[12] Anthony, L., Products, Processes and Practitioners: A Critical Look at the Importance of Specificity in ESP1, Taiwan International ESP Journal, Vol. 3:2, 1-18, 2012.

[13] Dovey, T., What purposes, specifically? Re-thinking purposes and specificity in the context of the 'new vocationalism', English for Specific Purposes, 25:4, pp. 387-402, 2006.