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Gayle G. Elliott Prof
University of Cincinnati - Main Campus, gayle.elliott@uc.edu

Noriko Fujioka-Ito Ph.D
University of Cincinnati, Noriko.Fujioka@uc.edu

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Developing Global Engineers through Cooperative Education: The University of Cincinnati Japanese Language and Culture Model

AUTHOR

Gayle G. Elliott

Associate Professor, Division of Professional Practice
University of Cincinnati

Noriko Fujioka-Ito

Assistant Professor of Japanese
McMicken College of Arts and Sciences
University of Cincinnati

ABSTRACT

Technical education can no longer be the only defining factor in tomorrow's technical leaders. Today's engineering students must develop global skills to be effective in the global marketplace. International experiential education is essential for educating the engineering leaders of tomorrow. The need for globally-minded engineers is well recognized and universities are attempting to integrate programs into the engineering curriculum which will prepare engineering students for the international work environment. The University of Cincinnati (UC) International Co-op Program (ICP) was created to respond to this need.

The Asian Studies program at the University of Cincinnati exists as a network function across interdisciplinary fields (such as languages, economics, history, geography, and political sciences) with a focus on Asian countries. Students can major in Asian Studies, double major, or minor/certificate in Asian Studies with another major field of study. The International Co-op Program (ICP) offers students the opportunity to learn the Japanese language and culture in preparation for an eight-month capstone co-op assignment (internship) in Japan. Some ICP students complete additional coursework, above that required to participate in the ICP, and also earn a certificate in Asian Studies at graduation. This paper describes: a) background and curriculum of the ICP at UC, b) development of the ICP Japanese program including prior study results with regard to characteristics of engineering students and the suitable syllabus types for ICP students, c) the ICP Japanese course curriculum with the description of four phases of preparation for co-op assignments in Japan, and d) the future direction of online materials using the words included in the engineering terminology dictionary in order to develop ICP students' autonomous learning abilities and Japanese language proficiency at co-op sites.

INTRODUCTION

ABET criteria for accrediting engineering programs state that students must attain "the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context."¹ A reflection of the changing role of engineering, such criteria are deemed a necessary aspect in educating the "Engineer of 2020."² Our interdependent global society requires engineering skills to address issues related to health, security, and the environment, as well as international commerce.³

A major RAND research study in the 1990's concluded both universities and corporations now believe that students must understand the global nature of economics, speak other languages, and be able to assess decisions in more than one culture. The research results suggested that universities must do more than "tinker with the edges of the curriculum." A comprehensive approach is needed, and relevant work experiences should be a prime component.⁴

Work abroad experiences prepare students for the global market, improve foreign language ability, and enhance employability upon graduation. Students living and working in an international location grow personally and professionally and gain vital cross-cultural understanding and communication skills.

Employers benefit by developing strong relationships with key universities that offer these programs, and by attracting highly-motivated students; thereby gaining employees who have technical expertise as well as a global perspective and second language skills. When employers hire co-ops or interns to work internationally, they are investing in potential leaders that can impact their growth around the world.

Universities that provide work abroad options gain world-wide visibility, strengthen ties with major industry players, increase the flow of technology between the institution and industry, and position themselves to attract students who want a value-added education.

The benefits are clear, but the models for achieving work abroad objectives are extremely varied. The challenge is for universities to coordinate these efforts and to open dialogue with industry on how to better prepare tomorrow's workforce through international programs.

The University of Cincinnati College of Engineering did not believe that study abroad could be integrated into the existing curriculum. The mandatory cooperative education (co-op) program, which alternates discipline-related work experience with coursework, had already extended the traditional four-year baccalaureate program to five years. In addition, students are either in class or on co-op every quarter, including summers, from the sophomore through the senior year. It was unlikely that students already in a five-year program would be willing to add another year or even six months to study abroad. International experience through the co-op program was the model that UC chose to pursue. This paper will provide an overview of the UC Co-op Program and examine one of the language models available: Japanese.

UC CO-OP PROGRAM

In 1906, Herman Schneider, Dean of the College of Engineering at UC, developed the concept of Cooperative Education. Today UC has the largest cooperative education program at any public university in the Country, with more than 5,000 student placements annually and approximately 1,500 employers. Today the model of cooperative education (Co-op) has been adopted by universities in almost 50 countries around the world. The Co-op Program provides students with multiple alternating work experiences which are integrated into the middle three years of a five-year baccalaureate curriculum. Ideally, the experiences will provide professional growth by progressively increasing breadth or depth of knowledge in their academic field through each co-op experience. Through multiple progressive work terms, students can transfer learning between the classroom and workplace and prepare for future career paths.

Almost ninety years after the Co-op Program was created, in the early 1990's, the ICP was created as an option for (initially engineering, and later all co-op) students to gain second language proficiency and international experience. It was believed that this program would attract students to UC and would meet the needs of potential employers for students with this skill set. A number of articles support these expectations, and two are cited below. One focuses on student interest, the other on employer needs.

In their report titled "Public Experience, Attitudes and Knowledge: A Report on Two National Surveys about International Education" (2001), Hayward and Siaya discussed results of a survey of 500 high school students planning on going to college. Ninety percent of all students surveyed felt that international education would give them a competitive edge in the workplace. In the early 1990's, the availability of international options for engineering students was rare. UC became a pioneer

in the area of international engineering education, and the program has proven to attract highly motivated students, with a variety of academic options, to UC. In their article titled "Employer Attitudes toward Study Abroad" (2007), Trooboff, Vande Berg and Rayman cited a survey distributed to 352 companies across the US. Twenty-nine percent of those receiving the survey responded. Eleven percent of respondents were CEO's, presidents, or their designee. Eighty-nine percent of respondents held other positions within their company; and sixty-five of these were campus recruiters or human resources representatives. The survey indicated that internships or study abroad were valued higher than any other (non-degree) college experience with the exception of completion of a foreign language major or minor.

The ICP was created as an academic option available to students in the UC Co-op Program. To participate, students are required to maintain a 3.0 GPA and be in good standing in the Co-op Program. The acceptance criteria ensure that students who undertake the language training are comfortable and successful with their existing academic program. Following initial acceptance, the rigors of the preparation program increase the likelihood that students will succeed overseas. UC believes once the acceptance criteria are met, the program is self-selecting. Course content and the commitment required to complete the preparation program ensures that student eligible for international placement are highly motivated to succeed and have realistic expectations about living and working abroad. Language options are available in Japanese, German, French and Spanish.

The program is designed to fit into the students' existing curriculum, with one co-op shortened for intensive language instruction. The schedule is as follows:

Freshman Year:	Apply to the International Co-op Program (ICP)
Sophomore Year:	Enroll in the Orientation to International Co-op course and begin domestic co-op assignments
Pre-Junior Year:	Continue domestic co-op assignments and enroll in summer intensive language and culture course in Japan the last seven weeks of the summer semester.
Junior Year:	Enroll in language enhancement course autumn semester and co-op in Japan spring and summer semesters.
Senior Year	Same schedule as non-ICP students

A model of the Japanese program structure is shown here:

YEAR	AUTUMN	SPRING	SUMMER	
1 st Year	Classes	Classes	Off	
2 nd Year	Classes	1 st Co-op	Classes	
	Orientation to International Co-op		Choice of ICP Elective	
3 rd Year	2 nd Co-op	Classes	3 rd Co-op	Intensive Japanese
			Short Co-op	7-Week Intensive Japanese
4 th Year	Classes	4 th and 5 th Co-op in Japan		
	Japanese language/culture			
5 th Year	Classes	Classes		

Through the ICP, students are provided not only with workplace skills but also with opportunities to develop effective communicative skills, problem solving abilities, life-long learning abilities, and global views through language/culture courses. This combination of academic experience in language and in their field as well as practical work experience in the US and abroad, enables graduates of the ICP to contribute to employers in the US as well as the international community after graduation.

Preparation Begins with Culture in Co-op Education Context

As students prepare to participate in the UC Co-op Program, they enroll in a course titled "Introduction to Cooperative Education". This course enables students to be successful in the job search and work place environments by preparing them to write a resume, interview, and perform as a professional when they enter the workforce. These are the skills students need to succeed as they embark on the first steps of their career. Similarly, the first component of the ICP preparation program is a course titled "Orientation to International Co-op". Like the Intro to Co-op course, the ICP course is offered through the Division of Professional Practice and is intended to provide students with skills they need to successfully live and work in a foreign country. The course is designed with several objectives in mind. First,

to ensure students understand the requirements of the ICP and will be eligible for placement in a co-op job overseas; and second, to give students an overview of the four cultures represented by the ICP. Development of a multi-cultural view is imperative to a successful international assignment. In addition to developing an understanding of other cultures as they relate to the US culture, the course provides students with information which enables them to develop realistic expectations of their upcoming experience living and working in a foreign country; as well as with coping mechanisms to adapt to their new culture.

The Japanese program presents a unique set of challenges somewhat different from the other three languages. Many students studied German, French or Spanish in high school; rarely does the ICP have a student who has studied Japanese. Students in the other programs often have family roots or have traveled to Europe or Latin America; but few students with Japanese backgrounds or experience have participated. In addition, students in the Japanese program must not only develop an understanding of different cultural aspects but also different sentence structures and three new writing systems (kanji, hiragana and katakana) to effectively communicate in Japanese.

Included in this paper is a discussion of the importance of strengthening simultaneously Japanese language study and students' academic field, development of Japanese courses for ICP including prior study results with regard to characteristics of engineering students, description of phases of preparation for co-op assignments in Japan, and the future direction of online materials using the words included in the engineering terminology dictionary in order to develop ICP students' autonomous learning abilities and Japanese language.

International Co-op Program Japanese Courses

The sequence of Japanese language courses for the ICP students is designed using the proportional

approach. Yalden (1980) originally developed a proportional syllabus for second language learners. In this approach, the study of grammar remains in sharper focus throughout the first level than the study of functions and discourse skills. Linguistic form gradually becomes de-emphasized, and communicative functions and discourse skills are given more prominence as teachers and students progress toward the end of the advanced level. Adopting the notion of this proportional syllabus, the goals of four phases of Japanese program are gradually changing from establishing fundamental abilities of creating language structures, preparing for daily interaction with business people, and practicing communicative language use in real life situations overseas.

The sequence of the phases of Japanese language training is as follows:

Course	Duration	Materials
Summer Intensive	6 weeks 30hrs/ week Total: 180hrs	-Genki 1: Integrated Course in Elementary Japanese (Banno, E., Ono, Y., Sakane, Y., Shinagawa, K., & Tokashiki, K., 2011). -The Japanese Today (Reischauer, E. O., & Jansen, M. B., 1995)
Fall Semester	15 weeks 3hrs/ week Total: 45hrs	-Getting Down to Business: Japanese for Business People (Yoneda, R., Fujii, K., Shigeno, M., & Ikeda, H., 2006) -Video, websites etc.

First Phase (Summer Intensive Course—Six Weeks from July to August)

The summer intensive course consists of language and culture components in immersion settings. The language component is designed in the analytical approach with considerations of communicative goals. Because college students (especially students in the engineering field) are usually able to intellectually analyze language structures, new grammatical items are taught with English explanations first. After completing written exercises at home, functional and communicative exercises are conducted in Japanese on the following day so that students will be ready to live in Japan a half year later. This course also adopts a content-based curriculum and involves language acquisition that integrates the contents of the learners' academic fields such as engineering and the target language. In addition, in the culture class, which runs for two hours each Friday, students are provided basic cultural information about Japanese society through lectures and discussion on geography, history, and industry using audio-visual aids and visiting a Japanese company.

Second Phase (Fall Semester Language Enhancement Course—Fifteen Weeks from August to December)

During the fall semester, the students start to use a textbook which enables the students to master conversational expressions that are usual in a business environment. Additional materials (such as videos) are used to expose students to a wide range of social and cultural aspects of interest by viewing foreigners' experiences in Japan. The proportion of linguistic form exercises is reduced, whereas the proportion of oral practice in a larger discourse is increased. This is accomplished by using integrative activities in various business situations. Interview projects are assigned so that the students have opportunities to communicate orally with members of Japanese language communities. In addition, students learn how to write Japanese email messages in business settings.

The German ICP language program also requires an in-country language and culture program prior to students beginning their international co-op assignments. This is not necessary for Japanese because students spent time the previous summer in Japan learning the language and culture. Students

often stay with host families during the summer intensive course, which not only increases their language proficiency, but provides insight into the culture that could not be obtained through other activities. The in-country program is designed to enable students to assimilate and understand their new environment while providing ample opportunity to apply their growing knowledge of Japanese on location. In addition, it provides an environment in which students begin to adjust to their new culture, while still feeling the security of being with a group of familiar friends. This is important to successful preparation of students for an international co-op assignment.

Directions for Future Improvement

ICP students begin the summer intensive course with no background in Japanese language learning. At the end of the seven-week course, most students are able to respond to questions on the most common features of daily life and convey meaning to interlocutors. This satisfies the standards of the Novice High level, according to the oral proficiency guidelines of the American Council On-the-Teaching-Of Foreign Languages (ACTFL).

When they return to the University of Cincinnati for senior year, following the international co-op experience in Japan, the language proficiency levels are varied. At the completion of the program, most of them can reach the Intermediate level, where they can participate in conversations on general topics and satisfy personal needs and social demands. In our observation, as would be expected, students' levels of proficiency are directly related to the opportunities they had to utilize the language in Japan. Some students work in environments where little to no English is spoken. These students are thrust into the language and benefit significantly in the long run. Others work in environments where the English of their colleagues is better than their Japanese. If students are not diligent about insisting on using Japanese, it is easy to fall into the habit of communicating in English, and their Japanese proficiency does not see significant improvement. Therefore, we have been developing materials especially for students who are assigned co-op jobs in Japan and want to continue to study Japanese while they are there.

An English-Japanese Quick Reference Dictionary, which was compiled to assist the engineering student or intern in learning vocabulary, has been being developed by ICP instructors with the assistance of engineers and students majoring in engineering. This dictionary includes words that were chosen based on English vocabulary from domestic co-op sites and input from students that have traveled to and worked in Japan in the engineering field. Two needs analysis surveys about this dictionary were conducted several years ago with students who had co-op assignments in Japan. Based on the students' feedback, it has been revised and published at the ICP website. Additionally,

online materials using the words included in this dictionary have developed so that students who have already completed the language courses prior to their co-op assignments in Japan can individually continue to learn new technical words and develop their language skills at their work and further be able to meaningfully develop their language proficiency. Language learning and multiple-level cultural understanding should involve various aspects of language, not simply focusing on vocabulary. It is necessary to further develop materials which enable the students to compare the concepts of their home and target culture based on five elements of National Standards for Foreign Language learning (communication, culture, connections, comparisons and communities). We developed materials for General Electric (GE) and students were able to utilize the same materials on a website to learn new terms in engineering and business fields and develop an understanding of Japanese industries. The theme of Material A (Appendix A) is enterprises in Japan. The sequence of activities of this part is as follows. First, students comprehend engineering terms in the passages. Second, students compare and contrast each enterprise at GE Japan. Third, students develop critical thinking skills by reviewing the manufactures of enterprises. In Material B (Appendix B), listening to interviews of female employees, students understand and develop the multiplicity of cultural perspectives on Japanese working women in Japanese companies. In addition, students further gain an insight into views of career-oriented women in a country, which is still considered as male-dominant, by interviewing them in Japanese. Judging from piloting these activities with ICP students previously, it would be necessary to create a website or a course management system for measuring students' learning motivation and assessing progress of their projects overseas. Furthermore, various types of activities should be developed in order to satisfy a variety of students' specialties.

CONCLUSION

A Hart Research Associates study ("Raising the Bar: Employers Views on College Learning in the Wake of the Economic Downturn," 2010) found that in a survey of 302 employers in organizations with at least 25 employees, sixty-seven percent felt that colleges should place greater emphasis on learning outcomes which include "the ability to understand the global context of situations and decisions." Sixty-five percent felt greater emphasis should be placed on outcomes which include "global issues and developments and their implications for the future." In addition, seventy-nine percent felt the "ability to apply knowledge and skills to real-world settings through internships or other hands-on experiences" was important.

Callanan and Benzing (2004) determined that recent college graduates who completed an internship were 4.43 times more likely to secure a job after graduation

than those who did not. Students who develop second language proficiency and complete their internship abroad increase their marketability exponentially. The International Co-op Program responds to these needs. Students bring experience and a skill set to their careers that students without international experience cannot compete with. A few examples can be found in quotes from ICP students.

“No one event has changed my life as much as the ICP experience. I now fear no map, subway, adventure, entrée, beverage, or [highway]. My tolerance is now my strongest trait.” This two-part statement is the epitome of what occurs when students go abroad. They realize they are flexible, adaptable, willing to take risks, and can succeed in a new environment. They also, while still young enough to have it make a strong impact, develop an understanding of and appreciation for cultural differences.

“I know I can succeed no matter what I encounter because at least I know it will be in English!” This comment puts the experience into a different perspective: If they were able to tackle all challenges related to working in a foreign country and in a foreign language, any challenge in their home country and native language seems much easier to handle. The international experience thus empowers them to deal with any difficult situation they might encounter at home. Most students graduating and accepting a job in the US would not even be aware that there are far greater challenges out there somewhere abroad where they cannot use English.

Programs like the ICP provide valuable learning experiences for students, particularly in schools like University of Cincinnati where the student population is drawn largely from Ohio. Many come from rural Ohio, and this is their first time away from home. Although students are more “well-travelled” in recent years, many have never been outside the US. Some, prior to

going halfway around the world for their international co-op assignment have never been on an airplane. Through their co-op experience in general and the ICP in particular, they grow into strong professionals with the knowledge that they can do anything they choose. They develop a tremendous amount of self-confidence from the experience of moving alone to a foreign country and being required to function as a professional in a language they began learning only six months before.

The ICP provides students with a significant advantage when they begin searching for full-time positions. Interviews often begin with the recruiter saying something like “I see you worked at XXX in Japan. Tell me about it.” From there students often find the majority of the interview is consumed with this discussion. It enables students to relax and be more animated as they’re discussing an experience of which they feel passionate and find it easy to come up with responses to questions like “tell me about a time you faced a challenge.” As full-time hires, ICP students have accepted indefinite assignments in countries speaking the same language they learned through the ICP as well as countries speaking a third language. To potential employers, a student’s proven record of success overseas is a strong indication that they can be placed anywhere and succeed. This often places them on a fast track for highly sought graduates after international assignments. ICP alumni are currently working in Japan, China, Canada, South America, Europe, and the Middle East. And finally, students who participated in the ICP have a strong loyalty to the program and willingness to help create similar opportunities for the students who follow them. They promote the program to their employers and facilitate establishment of co-op programs utilizing students in the US and abroad. International programs are expensive, time intensive, and require a tremendous amount of energy and patience to establish. But universities which have successfully developed these programs understand the strong benefits they bring to their students, faculty, employers and the community.

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Appendix A

Material A: Reading Material on Understanding Japanese Industries (Excerpt)

1. GEアドバンス・マテリアルズ事業

日本GEプラスチック

革新的な高機能エンジニアリングプラスチックを開発製造・販売しています。製品ラインナップは、耐熱性、耐候性、耐衝撃性、耐薬品性、高強度、難燃性といった特質を備えて多岐にわたり、お客様にとっての最適な材料を常に提案し続けてきています。

Listening * Writing Exercises (Examples)

読む前に

- A ゼネラル・エレクトリックは、どんな企業ですか。日本語で書いてください。
B 日本のゼネラル・エレクトリックには、11の事業部門があります。

Material A を見て、下のリストに書いてください。

- 1 GEアドバンス・マテリアルズ事業
- 2 GEインシュアランス事業
- 3 GE[]事業
- 4 GE[]事業

Part 3: 「GEエネジー事業」のセクションを読んで答えてください。

- i) ガスエンジンで有名なのは、どの事業部
ですか。

_____事業部

Part 4: 「GEコンシューマー&インダストリアル事業」「GEトランスポーターション事業」「GEヘルスケア事業」のセクションを読んで、あなたがどのセクションで仕事がしたいか、その理由を書いてください。

Appendix B

Material B: Listening Material on Understanding Japanese Industries (Excerpt)

GE コンシューマー・ファイナンスコレクション（管理企画）アシスタントマネージャー 黒澤直美

Interviewer (R): 黒澤さんは、今までどのようなお仕事をされてきましたか。

Interviewee (E): 1992年にミネベア信販に契約社員で入り、千葉にある回収センターでオペレーター業務をしました。その後、ミネベア信販が信販・カード事業をGEの営業に移し、1994年12月にGEグループ企業になりました。1996年に信販会社で初めての集中オペレーション・センターが府中にでき、その時に正社員になりました。

Listening Exercise * Interview Project (Examples)

聞く前に

A 日本へ来る前、会社にいる女の人は、どのような仕事をしていると思っていましたか。

B 日本に来てから、日本で仕事をしている女の人はアメリカで仕事をしている女の人と何が違うと思いましたか。

Part 1: GEで仕事をしている三人の女の人のインタビューを聞いて、空白に書いてください。

Part 2: 日本で仕事をしている三人の女の人にインタビューをして、次のことを調べてください。

- a) 仕事で問題があったとき、どうしたか。
- b) 仕事をしていてよかったことは、何か。
- c) これからどのようなことをがんばってほしいか。