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Empirical Studies of Motivational Changes of Japanese Engineering Students Learning English

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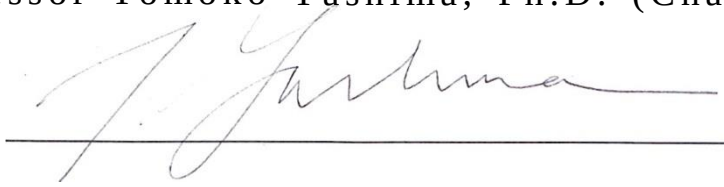

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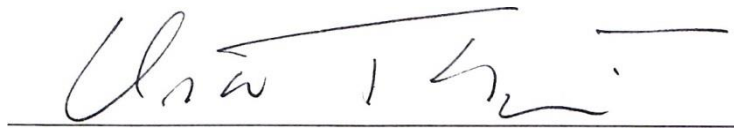

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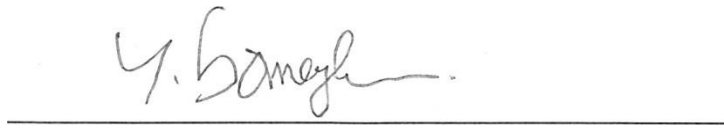

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論文要旨（概要）

経済界、産業界の国際化・グローバル化が進む現代で、工学者も国際的な活動を余儀なくされ、理工系学生にとって国際言語としての英語運用能力習得が必須となっている。大学英語教育においても、職業上の英語使用状況に沿ったより実践的な教育が必要とされてきた。本論文では、理工系学生をより自立した英語学習へと導くために動機づけが重要であるという観点から、英語学習動機づけを促すことを目的とした教育的介入の影響を Dörnyei による第二言語学習動機づけセルフシステム理論(the L2 motivational self-system)と Deci and Ryan による自己決定理論(Self-determination theory)を理論的枠組みとして用いて検証した。

Literature review では、理工系学生を対象とした英語教育について、ESP 研究及び Lave and Wenger による状況的学習論（実践の共同体 Community of practice）の概念も用いて検討し、英語学習動機づけの重要性及び工学者としての将来的な英語使用状況を想定した想像上の国際専門家集団(Imagined international discourse community)を教室内に創り出すことの意義について議論した。更に、英語学習動機づけに関する研究を振り返り、理工系学生の英語学習動機づけ及び教育的介入による動機づけ変化を検証するために用いる二つの理論的枠組みを紹介した。the L2 motivational self-system では、理想の自己像(ideal L2 self)とこうあるべきと考える自己像(ought-to L2 self)という二つの自己像を明確に持つことで、現状からあるべき姿へと近づくために学習に取り組むとされており、本論文では理工系学生の英語使用工学者としての自己像を検証するために用いることにした。Self-determination theory では、動機づけのレベルが活動（学習）への取り組みに対する自己決定の度合いによって内発的

動機づけ、4 段階（統合的調整、同一視的調整、取り入れ的調整、外的調整）の外発的動機づけ、及び無動機の 6 段階（本研究で用いる理論的枠組みでは統合的調整を除いた 5 段階）に分類されており、学習や活動における心理的 3 欲求（自律性、有能性、関係性）が満たされるとより内発的にまたは自己決定的に学習や活動に取り組むとされ、動機づけ変化過程や変化のメカニズムを見ることができるとされている。本研究では、この理論的枠組みを、特に教育的介入による動機づけ変化の過程及び変化要因やメカニズムを検証するために用いることにした。

本研究の教育的介入では、Imagined international discourse community を教室内に創り出す一例として、工業製品を紹介する英語プレゼンテーション活動を用い、1 年間の技術英語クラスの中で、計 4 回のプレゼンテーションを中心とした授業を行った。英語プレゼンテーション活動は、同じ製品を紹介しながらも内容が少しずつ複雑になるよう、工業製品の概要説明、類似製品との比較、製品の使用法を含めた手順紹介、ビジネスプレゼンテーションというテーマを設定し、授業内で発表テーマに沿った表現方法やプレゼンテーションテクニック、発表構成に対する指導が行われた。紹介する製品は、学生が自己の興味や将来作りたい理想の製品を選択するようにし、第 1 回は 1 人、第 2 回以降は 3 人以下のグループを選べるよう、選択肢を設けるなどの工夫も行った。各プレゼンテーション後、学生は台本、学習記録シート、学生間評価シートを提出し、プレゼンテーションと台本をそれぞれ評価した総合点を用いて成績を出した。

上記のような授業実践の中で、二つの理論的枠組みを用い、Study 1 では量的横断調査を用いて理工系学生の工学者自己像と英語学習自己像及び動機づけの関係を調査し、Study 2 と 3 では量的縦断調査、Study 4

では質的調査を用いて工業製品を紹介する英語プレゼンテーション活動を中心とした授業実践による動機づけ効果について検証した。以下にそれぞれの調査結果をまとめる。

Study 1 では、the L2 motivational self-system と Self-determination theory を用い、理工系学生の工学者自己像と英語学習自己像及び動機づけの関係を調査した。調査の結果、理工系学生は、工学者としての成功に英語学習が必要であるという意識を持っていること、目標実現や将来の成功のために英語学習に取り組む姿勢を持つ様子が明らかになり、工学者としての自己像と英語学習動機づけや英語使用工学者としての自己像の関係が示唆された。

Study 2 では、the L2 motivational self-system を用いて、授業実践による理工系学生の英語使用自己像の変化を事前・事後調査を用いて検証した。調査結果から、英語プレゼンテーション活動中心の授業によって、学生の教室内英語使用不安が解消され、自己の英語力に対する評価が上がる様子が伺えた。

Study 3 では、the L2 motivational self-system 及び Self-determination theory を用いて授業実践による理工系学生の英語使用自己像の変化及び英語学習動機づけ、英語学習における心理的 3 欲求の充足について、授業年度初回・中間・最終の縦断調査を行った。結果からは、理工系学生が英語プレゼンテーション活動を通して、英語学習を意味のあるものとして考えていく様子が伺えた。また、英語プレゼンテーション活動中心授業において、学生は今までに受けてきた英語授業よりも心理的 3 欲求（自律性・有能性・関係性）が充足されたと感じている様子が伺えた。特に、英語プレゼンテーション活動による有能性欲求の充足は、理工系学生がより自己決定レベルの高い外発的動機づけを持ち、英語を学習し

なくてはいけないという意識に影響することが明らかになった。また、英語プレゼンテーション活動による、授業開始時に最も動機づけレベルが低かった学生の内発的動機づけを上げる効果も示唆された。

Study 4 では、学生が各発表後に提出した学習記録シート(learning self-record sheet)の記述内容を質的に分析した。調査の結果、1 年間の授業の中で、テーマを変え、少しずつ複雑になる課題を持って英語プレゼンテーションを行う中で、理工系学生が英語を他者とのコミュニケーション手段として捉えるようになる様子を伺うことができた。また、質的分析から Study 3 で得られた結果をより詳細に説明する、理工系学生の英語学習動機づけ変化の過程やメカニズムが示唆された。つまり、プレゼンテーションの回数を重ねる毎に、学生はより自発的に台本や発表の改善に取り組むようになる（自律性欲求の充足)、より積極的に取り組んだ結果として達成感や成長を実感する（有能性欲求の充足)、グループ発表での成功を通して関係性欲求が充足される様子が伺えた。更に、達成感や成長の実感を通して将来英語を使用する状況をより明確に想像するようになり、結果として英語使用工学者としての理想の自己像(ideal L2 self)や英語を学習しなくてはいけないと言う意識(ought-to L2 self)が構築されていく様子が伺えた。このような英語使用工学者としての自己像構築により、授業履修後の英語学習課題や目標が生まれ、将来の英語学習動機づけへとつながる過程が示唆された。この過程は、英語プレゼンテーション活動が imagined international discourse community としての役割を果たす様子を示していると考えられるだろう。

上記 4 調査を通して、本論文では、理工系学生の英語学習動機づけ傾向を知り、教育的介入による動機づけ変化過程を見ることで、1）理工系学生の英語学習動機づけに関するデータの蓄積、2）the L2 motivational

self-system と Self-determination theory を同時に理論的枠組みとして用いることで理工系学生の英語学習に対する意識の特徴や動機づけ変化のより構造的な理解、3）量的調査結果に質的データの分析結果を合わせることで動機づけ変化過程や 2 理論の関係性のより詳細な理解について、動機づけ研究分野に貢献できたと考えらえる。また英語教育分野においては、1）将来の英語使用状況を想定した英語プレゼンテーション活動を通して、理工系学生は英語をコミュニケーション手段として用いることを意識するようになり、英語使用工学者としての自己像が構築されていく様子から、自己の知識を伝えるという活動は、理工系学生が英語を職業上で使用することをより明確に意識する上で有用であることを示唆し、2）ESP 分野で語られることの多かった理工系学生への英語教育について、Community of practice の概念や動機づけ理論を用いて検討することで、専門知識も英語力も不十分で、将来の進路やより詳細な専門性が不明瞭な学生たちに対する新たな教育的アプローチを提案することができたと言えるだろう。

本論文では、年 4 回の工業製品を紹介する英語プレゼンテーション活動を中心とした授業実践による影響を、英語学習動機づけの視点から検証し、理工系学生がプレゼンテーション活動を通してより自発的に発表準備を行うようになり、達成感や自己の成長を実感することによって、英語使用工学者としての自己像を確立していくプロセスを明らかにすることができた。将来の英語使用状況を想定し、学生もその状況を自分のものとして実感できる活動によって、学生は英語を「学ぶ」のではなくコミュニケーションに「用いる」ことを意識するようになったとも考えられる。

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understood the importance of my research and supported me.

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1. Introduction

"Mathematics, English, and computers are necessary tools for engineers." Engineering professors repeatedly used this phrase when I was an engineering student. Twenty years on, the internationalization and globalization of the industrial and economic fields have progressed rapidly. According to the Ministry of Economy, Trade and Industry (METI, 2013), the 2012 overseas production ratio for manufacturing industries (based on all domestic companies) recorded 20.3%, exceeding the highest ever record of 19.1% in 2007. Therefore, the overseas activity of manufacturing industries is becoming more and more active, resulting in a strong demand for engineers working overseas and communicating with people throughout the world. To adapt to the globalized society, professional communities of engineers have paid a great deal of attention to cultivating engineers who can adapt to the internationalized engineering society (e.g., Isoda, 1986; Nishimura, 1974; Tamura, 1983). English, as an international language, has become crucial as a communication tool for engineers in career settings.

As a consequence of these societal needs, Japanese colleges and universities face an increasing number of requests for practical and professional English courses, rather than general English courses, especially from engineering professors. Indeed, the importance of English skills, especially those related to the individual's specialized field, has been discussed from engineers' perspective as part of redesigning college-level engineering education to match the pace of internationalization (Inasaki, 2008; Sato, 1992; Song; 1998), and engineering professionals actually taught technical or engineering English classes (Kawaizumi, 1997; Maruyama, 1996,

2000). Recently, there has also been a strong demand by the Japanese government for global human resource development in Japanese colleges and universities (Ministry of Education, Culture, Sports, Science and Technology [MEXT], 2012). Therefore, many tertiary-level institutions have started offering courses in technical or scientific English, and engineering departments have been announcing and emphasizing the importance of learning English. The Japanese government also strongly encourages the internationalization of universities in Japan by recruiting more competent researchers and international students and by supporting Japanese students who want to study abroad (Education Rebuilding Council, 2013), which may force Japanese engineering students to face global competition for satisfying employment and career opportunities. Those strong demands for a pragmatic English education and the internationalization of the engineering society may be creating a rather competitive and demanding environment for engineering students. In other words, English skills are necessary for engineering students in Japan to gain competitiveness. Therefore, English education for engineers may be required to aid students in their future career settings, to promote their active learning, and to help them become independent English users.

To provide effective English education, we may need to understand the situations that engineering departments and students face. In this regard, there are three points that should be considered. First, many engineering students have prioritized studying mathematics and science over English during their time in high school (Kwansei Gakuin University, 2013), have chosen science and engineering majors because they were not good at English (Furuya, Bright, & Saika, 2008), and have shown little interest in learning

English (Hitomi, 2005; Miyama, 2000a; Shimazu, 2008; Teshigawara, 2008). Judging by these situations, it is not likely that engineering students will voluntarily start and continue to study English, despite repeatedly hearing about and seeming to be aware of the importance of acquiring English skills.

The next point concerns the professional field of engineering students. The fields of engineering vary considerably. Recently, engineering studies have been extended and integrated with other professional fields, such as medicine and biology. Thus, each area of engineering study has become more specific, and studies differ greatly despite belonging to the same department. This means that engineering students need to study broadly in their field in order to choose a more specific professional specialization. Thus, engineering students in Japan may be so busy studying for their major field that they do not have sufficient time to study English. At the same time, in the Japanese EFL environment, students have limited opportunities to use English outside class, so they may not feel an immediate need to learn English. This may also be the reason for decreased motivation for learning English. As a result, they tend to choose studying for their major field, on which they place a greater emphasis, rather than spending time to learn English.

Finally, in addition to the wide range of study fields, the future career of engineering students varies greatly. In data from MEXT (2014), 21% of students majoring in engineering and science in private universities continue on to graduate school, while 65% of them choose to seek employment. There are many career choices for engineering graduates such as working in manufacturing industries, the construction business, information-communication industries, wholesale trades, and others (MEXT,

2014). With so many career opportunities to choose from, at an early stage of college life, most university students do not have clear future career plans, which makes it difficult for both English instructors and students to clarify what kind of English skills they need to learn, despite recognizing the importance of acquiring these skills.

The challenges of providing English education to engineering students may include the following: to trigger their interest in English, to provide instructions that engineering students would consider worth taking time over, and to identify the type of English skills that represent the greatest common factor or that can be shared by all engineers so that they may learn English as effective and important knowledge.

Considering the strong demands of globalization and the challenges of English education for engineering students as described above, it may be necessary to develop an educational approach to English that fits students' future needs, their current situation, and English proficiency. Moreover, engineering students need to continue studying English after finishing required English courses. Thus, it is also important to lead those students to recognize the significance of learning English so that they can positively engage in acquiring the necessary language knowledge and skills required in their professional or specialized fields. Considering the discussions above on the whole, to guide those students in active and individual learning of English, *motivation* may be a key factor, since in the current situation the motivation of engineering students to learn English seems to be decreasing. For English educators to understand their students and design effective English programs for them, it may be necessary to understand those aspects of their psychology

that are related to their motivation for learning English. Understanding engineering students' psychology, adopting effective classroom practices to raise their motivation, and enhancing their learning may increase their success in future careers as well as contribute to cultivating human resources who can adapt to globalization. This dissertation presents and discusses the results of an empirical study of effects of educational intervention on engineering students in learning English in order to reveal the process and mechanism of how they become motivated and actively engage in learning the language.

In the following literature review section, the author will firstly review former research concerning English education for engineering students, and discuss (a) what constitutes an effective educational approach to English for engineering students, and (b) how to promote their motivation and actual learning. Then, the author will review research concerning motivational theories and introduce theoretical frameworks for examining engineering students' motivation to learn English.

2. Literature review

This chapter will review previous studies and theoretical background related to this thesis. First, I will introduce studies concerning *English education for engineering students* and theories related to those studies. Then, I will summarize the history of studies in *language learning motivation* and related motivational theories and introduce the theoretical framework of this thesis. Finally, I will discuss the research goals of this thesis.

2.1 English education for engineering students

To start with, I would like to discuss English education for engineering students in Japan, where college-level English education for students of all majors involves the requirement and expectation of pragmatic approach under the principle that strong English skills will be needed by the students in their future academic and professional lives. Therefore, this section will first review the studies on and theories of English for specific purposes (ESP), which seems to have been the primary context of practitioners designing effective English courses for engineering students. Second, as an additional concept to adapt ESP approaches to a Japanese context, the author will review studies that consider learning as participation in a community and introduce the concept of *community of practice* as the theoretical framework. Finally, the author will discuss problems underlying English education for engineering students.

2.1.1 English for specific purposes

English for specific purposes (ESP) has been put forward as a

promising method of practical, pragmatic English education. According to the definition by Dudley-Evans and St. John (1998), “ESP is designed to meet specific needs of the learner; ESP makes use of the underlying methodology and activities of the disciplines it serves” (p. 4). While discussing English education for engineering students, ESP should not be ignored, since it seems to have been the primary context within which researchers have tried to design effective English courses for engineering students; therefore, this section will review studies on ESP.

2.1.1.1 Definitions and characteristics of ESP

English for specific purposes originated in the need for English communication skills allowing communication among people in various fields and from all countries because of an “enormous and unprecedented expansion in scientific, technical and economic activity on an international scale” (Hutchinson & Waters, 1987, p. 6) due to *globalization*. At first, ESP was designed for intermediate or advanced adult students (Dudley-Evans, 1997; Dudley-Evans & St. John, 1998). Basturkmen (2006) explains that “ESP is understood to be about preparing learners to use English within academic, professional, or workplace environments” (p. 17), and that it “aims to speed learners through to a known destination” (p. 9). In general, ESP is considered to be a form of “learner-centered” English education, in that it takes into account learners’ professions and learning goals (Basturkmen, 2006; Belcher, 2006; Robins & Cullen, 2002). In Japan, ESP is commonly defined as studies for and education of English as a means to communicate within and outside of a *discourse community*. A discourse community is a professional group that

has proper and homogeneous needs and exerts effort to achieve the same goal (Miyama, 2000b).

Based on the above definitions and expectations, ESP researchers have tried to design more appropriate and effective English teaching materials, that is, those that are more *authentic* to the learners' prospective contexts and needs. Studies on ESP have progressed mainly along four paths: specifying *technical terms*, analyzing *learners' needs* (Hutchinson & Waters, 1987), analyzing *characteristics of texts* according to *genre*, *type of language*, and *prospective discourse community* of learners (Flowerdew, 2005; Swales, 1990, 2004), and analyzing *discourse* itself (Widdowson, 2007).

2.1.1.2 ESP studies in Japan

Colleges and universities in Japan have established a number of ESP-related classes particularly in the last twenty years because of an increasing demand for more practical English education. ESP researchers in Japan have tried to develop more authentic teaching materials, and have analyzed genre, text, and discourse from perspectives rooted in the original concepts of ESP (e.g., Katsuragi, 1997, 2000; Miyama, 2007; Miyama & Nitta, 2003; Miyama, Nitta, Mukuhira, & Imura, 2005; Tsuda, 2006; Yamauchi, 2005). However, it seems that ESP practitioners in Japan have struggled to design appropriate curricula for their students, who are usually in their first or second years, relatively low-proficient in English, and as yet lacking the degree of knowledge of their prospective or actual field (for example, familiarity with technical terms) to support them as they learn professional English relating to it (Anthony, 2009; Gally, 2009; Miyama, 2000b). This

struggle often leads to confusion on one part of ESP practitioners due in part to the structure of the Japanese college curriculum, in which course content gradually becomes more specific, advanced, and centered on a specialized field; as a result of this approach, students usually try to earn their required English credits at an early stage of their college life, but at that point they still have little field knowledge. Thus, the ESP field in Japan has progressed by developing ESP-based educational approaches and applying them in general English courses (Anthony, Noguchi, & Orr, 1998; Araki, 2005; Miyama, Noguchi, & Mukuhira, 2002).

Because ESP is oriented toward the career setting, ESP studies have also often aimed to facilitate autonomous or self-regulated learning of a kind that can be pursued by professionals. To support individual learning of this kind, *e-learning* materials have been developed (Fukui, 2009; Fuyuki & Ueki, 2009). Two such methods to promote and support autonomous or self-regulated learning, OCHA and PAIL, were introduced by Noguchi (2005). OCHA (*observe, classify, hypothesize, apply*) is a method to identify what language genres pertain to individuals' specialized fields and to better understand those genres, while PAIL (*purpose, audience, information, language features*) represents points to consider when observing and identifying these genres (Noguchi, 2009). These concepts were considered effective for strong curriculum design (Matsuoka, 2006) as well as self-regulated learning (Miyama, 2007). Terauchi, Yamauchi, Noguchi, and Sasajima (2010) made five proposals regarding college-level English education in Japan. These proposals are as follows: promoting autonomous (self-regulated) learners, including ESP in core curricula, understanding the

basic characteristics of ESP, preparing an environment to collaborate with professors in the relevant specialized field, and utilizing computers (ICT) as a tool. These proposals may have emerged at least in part because it is difficult to reliably identify and teach all the needs of particular student groups. In other words, the original idea of "English for specific purposes," which was to help learners acquire the necessary genre and discourse knowledge related to their (future) professional field in effective and economical ways, has moved to a more individually customized approach with less focus on the development of curricula and textbooks for particular groups.

Whereas most general English programs in Japan have traditionally not been formally coordinated between teachers, some ESP practitioners, especially those practicing and studying English education for engineers, have nevertheless worked collaboratively to construct programs that are more satisfactory (e.g., Hitomi, 2005; Morimura, 2010; Shimazu, 2008; Takefuta & Takefuta, 1998). Since ESP was originally conceived to facilitate learners' success in their future careers, some systematic English curricula have been constructed in collaboration with professors in the engineering field (Furuya, Bright, & Saika, 2008; Inasaki, 2008; Miyama, 2009; Yamauchi, Tokunaga, Izaki, & Yoshizumi, 1996). In other cases, an integrated course of technical and English contents has been designed, and taught in collaboration with engineering professors and English teaching assistants, who support language learning through web-based instruction (Yamamoto, 2009). It seems that professors in engineering fields have been especially willing to cooperate; indeed, they have been rather insistent that the creation of ESP-oriented

English curricula is important with the globalizing situation they are in and the constant English-using opportunities they have. Thus, ESP studies in Japan have burgeoned in several ways to fit the needs of the Japanese context, especially for (future) engineers.

2.1.2 Acquisition and participation metaphors

ESP studies have focused on the English-using situations of students' future careers and tried to facilitate student acquisition of the necessary English skills in their prospective discourse communities. The concept of discourse community takes the view that individuals participate in a professional community, where they share common goals, the specific genres used in the community, specialized terminology, and a high general level of expertise (Swales, 1990). To give further thought to the idea of participation, not training in vague general-purpose discourse but participation in a real community in which students will participate in the future; the concept of *community of practice* is considered. From the perspective of the real community as a place where students may actually meet people and perform tasks through English, this dissertation employs community of practice as a theoretical framework to design English education for engineering students. This is a new theory of learning, which considers learning not as acquisition of knowledge but as participation in a community and development of community membership (Lave & Wenger, 1991). With the concept of community of practice, Lave and Wenger (1991) introduced the question of how newcomers to a field internalize learned knowledge to build the identity of participants in a professional community, and characterized the process of

becoming a full participant in some sociocultural practice from a preceding state of "legitimate peripheral participation" by stating that "learning is an integral and inseparable aspect of social practice" (p. 31). In the language learning context, Norton (2000) studied the English learning process of immigrant women in Canada and their construction of L2 identities in the workplace and other communities in which they participated; Norton used the term "imagined community of practice" to describe these settings and claimed that L2 teaching that does not respect learners' imagined communities is ineffective. Yashima (2009), building on this concept, proposed the concept of an "imagined international community" (p. 148), asking whether "we might need an educational initiative to help make an imagined community visible or create one for learners, in which learning new words and sentences can be linked to an imagined international community" (p. 149). In later work, Yashima discussed the imaginative capacity of humans and argued that the learning experience would be more meaningful if learning activity involved interaction with members of the learner's imagined international community (Yashima, 2013). This concept was put into practice in a classroom as part of project-based English instruction, specifically a model United Nations project for high school students intended to introduce them to an imagined international community. The results showed that the students who participated most fully in the project showed similar changes to students who participated in a one-year study-abroad program in terms not only of their English proficiency but also of their international posture (individuals' tendency to relate themselves to the international community without identifying with any specific L2 group), and *frequency of communication*

(Yashima & Zenuk-Nishide, 2008).

In association with community of practice, two metaphors, the *acquisition metaphor* and the *participation metaphor,* have been discussed. The acquisition metaphor considers "knowledge as a commodity that is accumulated by the learner and […] the mind as the repository where the learner hoards the commodity" (Sfard, 1998, p. 5). In contrast, the participation metaphor views "learning [as] a process of becoming a member of a certain community" (Sfard, 1998, p. 6). Yashima (2013) has explained that the acquisition metaphor is predominant in English language teaching contexts in Asia, but the two metaphors are really complementary to each other, and therefore, we cannot adopt only one with the exclusion of the other. In relation to English education for engineering students, traditional ESP research has mainly focused on the linguistic features of English used in engineering fields and tried to find better ways to transfer the necessary knowledge to students in the classroom setting; therefore, it has been more closely aligned with a view characterized by the acquisition metaphor. In order to help students develop a realistic image of the way English is used in international communities of engineers, however, applying the participation metaphor may also be effective. English education that considers students' future career goals and English-using situations may thus help those students establish themselves as engineers in the international community, and their experience in that community will in turn further boost their English ability.

Noguchi (2010) also discussed how ESP classrooms may facilitate students' communication in discourse communities by allowing them to experience communication and make mistakes in an authentic environment.

Watanabe (2009) suggests further that the provision of a “pseudo-community of practice” in an ESP setting could help students become more aware of their prospective future discourse community. The concept of communities of practice is now discussed as an important concept in ESP fields (Terauchi et al., 2010). Thus, providing an imagined international community may help foster practical, authentic English classroom environments and educational programs for engineering students.

2.1.3 Future English education for engineers

English education for engineering students has long been considered a subfield of ESP studies, and various ESP programs and curricula, named engineering/technical English courses, have been practiced on engineering students. This section will summarize studies related specifically to English education for engineering students in Japan and discuss problems and concepts used in this field from the perspectives of curriculum development and student characteristics.

When designing and conducting engineering/technical English courses, English instructors have struggled because of a lack of engineering knowledge (Miyama, 2000a; Yamauchi et al., 1996). In this regard, Maruyama (1996, 2000) suggested the importance of developing professionals who hold knowledge of both engineering and English. In the practice of ESP-related courses, some have insisted on the importance of reading comprehension skills (e.g., Miyama, 2000a; Nishizawa, Yoshioka, & Ito, 2010, 2013), while others have focused on writing skills (e.g., Shimazu, 2008). It seems that more researchers focused on speech communication skills (e.g., Hayashi,

Kunioshi, & Noguchi, 2009; Morimura, 2010; Omi, 2000; Shinozuka, 2008; Teshigawara, 2008) as well as delivery skills of both writing and speech/presentation (Furuya et al., 2008; Kyouno, 2010). This variety of instructional focus and the fact that many systematic curricula have been developed, as introduced in section 2.1.1.2, may prove how difficult it is to identify students' specific future discourse communities and to specify what kind of English skills engineering students need. Therefore, Terauchi et al. (2010) suggested introducing communication skills, information-gathering ability, and problem discovery/solving skills that are necessary in any discourse community to ESP classes, particularly for undergraduate students. Therefore, English presentation/speech and writing skills are considered useful and necessary for global communication.

English instructors have often mentioned the low English proficiency level of engineering students (Furuya et al., 2008; Nishizawa et al., 2013; Shimazu, 2008; Takefuta & Takefuta, 1998). In particular, Takefuta and Takefuta (1998) investigated the gap between what students are capable of and what English skills companies or their future discourse communities expect them to be capable of. Other characteristics that have been discussed are students' lack of motivation or interest in learning English, and improving such motivation and awareness through ESP-related curriculum intervention has been reported (Furuya et al., 2008; Hitomi, 2005; Miyama, 2000a; Shimazu, 2008; Teshigawara, 2008). Although these motivational effects were discussed based mainly on classroom evaluation of students and written answers to open-ended questionnaires, it seems that ESP practitioners have considered motivation a key to successful learning and anticipated the

motivational effects of their classroom intervention. Moreover, ESP studies in Japan have recently shifted their focus toward supporting *self-study* and promoting *autonomous* or *self-regulated learning*. Researchers have found that self-regulated learning correlates with motivational orientation (e.g., Boekaerts, 1996; Pintrich & Groot, 1990; Pintrich, Roeser, & Groot, 1994; Wolters & Pintrich, 1998), while others have stated that autonomy is affected by motivation (Murphy, 2011; Paiva, 2011; Usuki, 2007). Therefore, motivation seems to be an important component of autonomous or self-regulated learning. Moreover, Ushioda (2011) suggests the importance of engaging students' identity as users of the target language, thereby creating an educational environment that fosters autonomy, and also the necessity of an authentic educational approach and materials to stimulate learners' personal involvement in language learning. The development of individual learners' self-images as users of the target language also seems important in this regard, because it may influence their degree of self-regulated or autonomous effort to learn the language (Lamb, 2011; Malcolm, 2011; Murray, 2011). Thus, for a budding engineer or other professional hoping to use English in their practice, developing the self-image of an English user may be very important.

From the ESP perspective, English education for engineering students is required to raise students' awareness or self-image as future engineers working in an international discourse community, to motivate those students to learn English, and to facilitate their autonomous or self-regulated learning of English. Motivation and the participation metaphor may be the concepts that should be focused on and used to understand engineering students, to

design appropriate English curricula for those students, and to examine the effectiveness of classroom intervention. With regard to English education for engineering students, who are often not yet sure what field of engineering they intend to enter and who often have only a limited or hazy image of what becoming an engineer will entail, this thesis considers that two factors will likely be crucial: (1) providing an *imagined international discourse community* to help engineering students become aware of their future "English-using situation" so that they can develop the self-image of an English-using engineer, and (2) raising their English learning motivation, which may also facilitate autonomous or self-regulated learning.

In this dissertation, the author uses the term an *imagined international discourse community* combining the concepts of an "imagined international community" (Yashima, 2009, p. 148) and a "discourse community" from ESP studies (e.g., Miyama, 2000b; Terauchi et al., 2010), which represents the integrated concepts of community of practice, participation metaphor, and ESP. An imagined international discourse community for engineering students could include situations in which they introduce engineering-related products or technology, or attend academic conferences to present their research. In these situations, the necessary English skills might be writing and presentation skills. Indeed, the majority of ESP studies that focus on engineering students have used presentation/speech activities (e.g., Furuya et al., 2008; Hayashi, Kunioshi, & Noguchi, 2009; Kyouno, 2010; Morimura, 2010; Omi, 2000; Shinozuka, 2008; Teshigawara, 2008), and many English self-study books for engineers have noted that many will be required in their jobs to write documents and give presentations in English (e.g., Campbell,

1995; Davis, 2005; Raman & Sharma, 2008). Moreover, group work and simulation activities using sales presentation as a final goal have been introduced as effective examples of situations representing students' future discourse communities (Miyama, 2007; Noguchi, 2010). For this thesis, I used an English-language presentation in which students introduce engineering technologies or machinery products that they are interested in to create an imagined international discourse community of engineers in the classroom. The details of the class and activity in question will be introduced later (section 3.3).

With regard to the second factor of English education for engineering students, which is to develop English learning motivation among engineering students, as defined above, a study (Johnson & Johnson, 2010) found that motivation increased when students felt pressure to earn required credits, but that it lowered as their *self-efficacy* decreased. Tsuchiya (2010) studied the effects of English classes using the workshop format, which was designed to reduce demotivation factors in engineering students learning English, and reported that participating students attended all classes with strong motivation to improve their reading comprehension speed. With these exceptions, few studies of English learning motivation focusing on engineering students have been reported. In this section, as the author has discussed the importance of increasing the English learning motivation of engineering students (which may also facilitate autonomous or self-regulated learning), the conclusion emerged that more research is required in this area.

It may therefore be useful to research engineering students' motivation and attitudes towards learning English so that instructors can

better understand the factors influencing these qualities and can design English classes and curricula that are more motivating for those students.

2.2 Foreign language learning motivation

This section will review studies in foreign language learning motivation and introduce the theoretical frameworks used to conceptualize foreign language learning motivation in this thesis.

2.2.1 Definition of motivation

Before reviewing studies on *foreign language learning motivation* in particular, this section considers the definition of *motivation* in general.

Motivation is a complex concept. It has been referred to as "the process whereby goal-directed activity is instigated and sustained" (Schunk, Pintrich, & Meece, 2010, p. 4) or as "a general way of referring to the *antecedents* […] of action" (Dörnyei, 2001a, p. 6; italics Dörnyei's). A more detailed definition is "the dynamically changing cumulative arousal in a person that initiates, directs, coordinates, amplifies, terminates, and evaluates the cognitive and motor processes whereby initial wishes and desires are selected, prioritized, operationalized and (successfully or unsuccessfully) acted out" (Dörnyei & Ottó, 1998, p. 64). When discussing language learning motivation, Gardner (2010) notes that motivation is multifaceted and points out the resulting difficulty of defining it. He explains the related concept of (language learning) *orientation* as "a general inclination, not a specific reason for learning another language" (p. 17), and mentions the prevalent confusion among orientation, motivation, and *reason*

for studying. As Dörnyei (2001b) explains, language learning motivation is related to *choice* to study, *effort* expended studying, and *persistence* studying a language. Thus, it is an important concept in capturing learners' understanding and endeavors to learn.

This thesis defines motivation, following Dörnyei (2001a), as being "responsible for why people decide to do something, how hard they are going to pursue it and how long they are willing to sustain the activity"(p. 7).

2.2.2 History

Dörnyei (2005) divided studies on foreign language learning motivation into three phases from a historical perspective: the *socio-psychological period* (1959-1990), the *cognitive-situated period* (the 1990s), and the *process-oriented period* (2000-). This section will review studies in foreign language learning motivation according to these phases.

2.2.2.1 The socio-psychological period

The first major study on second-language learning motivation was conducted by Gardner and Lambert (1959), from a *socio-psychological* perspective. That is, they considered that the development of bilingualism requires not only language aptitude per se but also motivation and knowledge of appropriate cultural behavior. On this basis, they then "determined the comparative importance of linguistic aptitude and certain motivational variables in learning a second language" (Gardner & Lambert, 1959, p. 267). Their results showed that students' linguistic aptitude and motivation factors, the latter being referred to as "a willingness to be like valued members of the

language community" (p. 271), were equally important for achievement in French, the students' second language. Gardner (1960) subsequently focused on Canadian Anglophones studying French in a bilingual environment and found that "achievement in French was associated with language aptitude, motivation to learn French, and an integrative orientation" (Gardner, 2010, p. 37). Therefore, Gardner and his colleagues conceptualized a second language as a *medium for participating* in a target language community and "regarded the motivation to learn the language of the other communities as the primary force responsible for enhancing or hindering intercultural communication and affiliation" (Dörnyei, 2005, p. 67). In this context, they developed *a socio-educational model* that regarded *integrative motivation* as a central concept (Gardner, 1985; Lalonde & Gardner, 1984). Integrative motivation consists of several components: *integrativeness*, *attitude toward the learning situation*, and (general) motivation (Gardner, 1985). *Integrativeness* "reflects a genuine interest in learning the second language for the purpose of communicating with members of the other language community" (Gardner, 2007, p. 88), while *attitude toward the learning situation* "involves attitudes toward any aspect of the situation in which the language is learned" (Gardner, 2007, p. 89). The socio-educational model also considers anxiety, especially in the classroom, and *instrumental motivation*, which refers to the reason to learn a second language for some practical gain and stands in contrast to integrative motivation. Gardner and his colleagues developed the *attitude/motivation test battery* (AMTB) (Gardner, 1985) to measure these variables as well as *integrative orientation,* or the desire to learn a language to further the social objective of communicating with speakers of the target

language (Gardner, 2007), and *attitudes toward the target language*, meaning the favorability of the attitudes individuals show to the people and cultures associated with the target language. Several studies of individual differences in second language acquisition have been conducted using AMTB (Gardner, Day, & MacIntyre, 1992; MacIntyre & Gardner, 1989, 1991).

These studies by Gardner and his colleagues focused mainly on second language acquisition in a bilingual setting, which helps explain why they considered integrative motivation to be more influential than instrumental motivation. Au (1988) criticized this assumption and doubted the importance of integrativeness in other foreign language learning settings, noting that other research in the field did not share the same notions as Gardner and associates. In large part as a result of Au's response to Gardner and colleagues' early work, research into foreign language learning motivation in the subsequent period came to adopt new approaches, which will be introduced in the next section.

Table 2-1
Major Motivational Theories

Theory		Summary	Motivational construct
Expectancy-value theory	(Wigfield, 1994; Wigfield & Eccles, 2000)	Individuals' expectation of success and the value they attach to succeeding determine their motivation to perform tasks.	- Expectations of success in á task - The value individuals perceive in success to have
Self-efficacy theory	(Bandura, 1993, 2006)	"Self-efficacy beliefs determine the goals people set for themselves; how much effort they expend; how long they persevere in the face of difficulties; and their resilience to failures" (Bandura, 1993, p.131).	- Learners' beliefs in efficacy - Teachers' beliefs also affect the learning environment
Goal-setting theory	(Locke & Latham, 2006)	If individuals are committed to a goal and have the ability, their performance on a task and the difficulty of the goal area will be found to be related. Specific, difficult goals lead to better performance than easy goals.	- Goal-setting
Self-determination theory	(Deci & Ryan, 1985, 2000; Deci, Vallerand, Pelletier, & Ryan, 1991)	Conceptualizes motivation in terms of intrinsic motivation and different levels of extrinsic motivation. Individuals' motivational level changes according to their levels of internalization and self-determination in relation to an activity they participate in. Furthermore, satisfying three psychological needs (autonomy, competence, and relatedness) leads to higher self-determination.	- Intrinsic and extrinsic motivation - Satisfaction of three psychological needs - Levels of self-determination

2.2.2.2 The cognitive-situated period

At the beginning of the cognitive-situated period, Crookes and Schmidt (1991) claimed that studies using the socio-educational model alone made it difficult to identify direct links between motivation and second-language learning and did not provide clear implications for language pedagogy. Others considered motivation to learn English as a foreign language (EFL) and discussed the possibility that instrumental motivation might be more important in EFL settings than previously realized (Dörnyei, 1990; Oxford, 1996). Much research into foreign language learning motivation in this period was inspired by these views.

Dörnyei and some other researchers conducted work on classroom dynamics in this period, examining *motivational change* and individual differences in the classroom setting (e.g., Clément, Dörnyei, & Noels, 1994; Dörnyei, 1994, 1996; Ehrman, 1996; Ehrman & Dörnyei, 1998). This type pf research applied motivational theories taken from the field of educational psychology to foreign language learning settings. Table 2-1 summarizes the major motivational theories in psychology that influenced L2 motivation studies at that time. The major concepts these theories hold in common are the relevance of learners' perceptions of their own ability, and the suggestion that there is a relationship between the value or hardness of a task and the motivation to perform it. Among the theories presented in Table 2-1, *self-determination theory* has frequently been applied to foreign language learning motivation research since Noels and others used it in their research into foreign language learning motivation (Noels, Clément, & Pelletier, 1999; Noels, Pelletier, Clément, & Vallerand, 2000). In this theory, the following

types of motivation are specified: *intrinsic motivation*, four kinds of *extrinsic motivation* (*external, introjected, identified,* and *integrated*), and *amotivation*. Individuals' motivational levels are said to change according to the levels of *internalization* and *self-determination* with which they participate in an activity (Deci & Ryan, 2000, 2002). Further, this theory also represents the process of motivational change as satisfying three psychological needs (*autonomy, competence,* and *relatedness*) leading to a higher level of self-determination (Deci & Ryan, 2000, 2002).

2.2.2.3 The process-oriented period

The process-oriented period is characterized by studies focusing on the process of motivational change.

Dörnyei and Ottó (1998) considered motivation to constitute "a dynamically evolving and changing entity, associated with an ongoing process in time" (p. 44) and elaborated a process model of L2 motivation consisting of two dimensions: *action sequence* and *motivational influences*. They also divided the process of motivational change into three phases: *pre-actional, actional,* and *post-actional*. In this model, Dörnyei and Ottó explained both the actions that occur in each phase and the motivational or influential factors that lead learners to take those actions. They emphasized the complexity of motivation as a construct and suggested the necessity of testing interventions based on this model. Similarly, Ushioda (2001) conducted two-round interviews, qualitatively analyzing how learners define the relationship between L2 learning and motivation. She designed a schematic model representing how learner conceptions of motivation might be defined in two

dimensions: motivation deriving from experience and motivation directed towards future goals. Her research revealed that how learners define their motivation differs according to their learning achievement and the quality of their learning experience, in contrast to prior quantitative research that had focused more on the importance of goal-setting. Ushioda concluded that motivation should be viewed as an ongoing process incorporating both perceptions and interpretations by the learner of L2 learning and L2-related experience, and the ways and degrees to which the resulting cognitions and beliefs sustain involvement in actual learning.

In longitudinal studies of classroom motivational effects, researchers have implemented various motivational strategies and instructional methods. Williams and Burden (1997) made suggestions, based on the cognitive approach and a social constructivist framework, for language teachers to use in motivating learners; they discussed the complexity of motivation and emphasized the importance of involving learners in decisions about their learning and in setting goals, and also suggested the importance of building learners' internal beliefs and to construct a supportive learning environment. Dörnyei (2001a), referring to motivational theories and frameworks including that of Williams and Burden, argued that four stages of motivation occur in the classroom and developed motivational strategies for each stage, namely (by stage), to create a supportive atmosphere and teacher behaviors, to use materials relevant to the learners, to increase or protect learners' self-esteem and belief, to set specific goals, and to include learners in decision-making. Thus, both approaches presented above suggest maintaining learners' self-esteem, involving learners in the setting of learning goals, and fostering

learners' intrinsic motivation.

2.2.2.4 Socio-dynamic perspective

After Norton's (2000) argument regarding the relationships between social power, identity, and motivation (which she prefers to call "investment") influenced by the community of practice perspective, researchers have developed theories involving *identification*, *self*, and social context. Some studies have focused on the process of learning as becoming a member of an "imagined community" (e.g., Norton, 2000; Yashima, 2009 see section 2.1.2 for a detailed review), drawing on the concept of community of practice (Lave & Wenger, 1991; Wenger, 1998).

Other studies have attempted to interpret Gardner's integrativeness. Yashima (2009), viewing English, in the EFL context, as a world language rather than one connected specifically to the cultures of Anglophone countries, postulated the concept of *international posture*, which reflects the tendency of individuals to relate to the international community without identifying with any specific L2 group. Dörnyei (2005) focused on integrative disposition, a concept referring to one's amenability to psychological and emotional identification with a group, and used the concepts of *ideal L2 self* and *ought-to L2 self* to represent how individuals imagine themselves as L2 users in future states; these concepts were the core of a new framework called the *L2 motivational self-system* (introduced in section 2.2.4.1 in more detail). The above concepts can serve as L2 learning motivators, either to realize positive outcomes (the ideal self) or to avoid negative ones (the ought-to self).

In this period, some researchers added the concept of *willingness to*

communicate to the extant models and studied the influence of variables introduced in former motivational theories such as Gardner's socio-educational model, on willingness to communicate in an L2 (e.g., Baker & MacIntyre, 2000, 2003; Hashimoto, 2002; MacIntyre, 2007; Yashima, 2002). Others conducted comparative studies to identify differences in motivation according to learners' culture and target language (e.g., Bernaus, Masgoret, Gardner, & Reyes, 2004; Dörnyei & Clément, 2001; Taguchi, Magid, & Papi, 2009).

The most recent phase in motivation research is what Dörnyei and Ushioda (2011) named the *socio-dynamic period*, in which researchers noticed the limitation of linear models or cause-effect relationships for justifying motivation system and started to consider the L2 motivation as a dynamically evolving process through "interaction with a multiplicity of internal, social and contextual factors" (p. 72). Studies of foreign language learning motivation shifted approaches "to explore how motivation develops and emerges through the complex interactions between self and context" (Dörnyei & Ushioda, 2011, p. 70).

2.2.3 Studies on English learning motivation in Japan

Studies on English learning motivation began to proliferate in Japan during the 2000s. Early studies focused on the characteristics of motivation in the Japanese foreign-language learning environment, where learners have few opportunities for contact with the target language. On this basis, these studies asserted the importance of instrumental (in addition to integrative) motivation (e.g., Hashimoto, 2002; Nakata, 2006; Yashima, 2000, 2002). Some

researchers focused on younger learners such as junior high school students to determine the factors that influence their motivation (e.g., Hayashi, 2009; Sugita, 2008; Sugita & Takeuchi, 2010). Others focused on even younger learners—elementary school students—and constructed educational models to understand the dimensions of their motivation (e.g., Adachi, 2010; Nishida, 2008; Nishida & Yashima, 2009b). Considering that many students are not interested in learning English, affective factors from the demotivation perspective have also been studied (e.g., Agawa & Ueda, 2013; Kikuchi & Sakai, 2009; Tsuchiya, 2004). Japanese research into English learning motivation has frequently taken the form of intervention studies mainly using self-determination theory, wherein English learning motivation has been manipulated through the implementation of various instructional approaches. For example, Namura, Ikeda, and Yashima (2007) examined the motivational effects of classroom instruction using motivational strategies based on the ARCS (attention, relevance, confidence, and satisfaction) model and concluded that the model was useful for improving classroom instruction from a motivational perspective. Nakata (2006) designed and examined the motivational effects of a project-based instruction method promoting cooperative learning using a computer and aimed at enhancing either written or spoken English communication. He found that encouraging autonomous learning raised students' intrinsic motivation. Other research based on self-determination theory will be introduced in the following section (2.2.4.2).

2.2.4 Theoretical frameworks

The main objective of this thesis is to examine the motivational effects of project-based instruction on Japanese engineering students' English learning, while using the theory of community of practice for instrumental design. For the theoretical framework of research, I relied mainly on two motivational theories: the L2 motivational self-system and self-determination theory. The L2 motivational self-system measures how the target students identify and understand themselves as L2 users, while self-determination theory helps us understand how changes in their motivation occur. In the following section, I will review these two theories.

2.2.4.1 The L2 motivational self-system

The L2 motivational self-system was developed by Dörnyei (2005) on the basis of an investigation of the effectiveness of Gardner's socio-educational model and its main concept of "integrativeness" among EFL learners. Building on Gardner's attention to the influence of attitudes towards the target language and the related culture on language acquisition, Dörnyei, Csizér, and Nemeth (2006) explained that EFL learners encounter English mainly as a subject in school and often do not have opportunities to make extensive contact with people from English-speaking countries. On this basis, Dörnyei (2005) noted that "a core aspect of integrative disposition is […] a psychological and emotional identification" (p.96); the "identification" in an EFL environment will be with the language itself rather than with a specific culture or group of people. On the basis of this insight, Dörnyei focused on the role of English as a world language, applying the concepts of

ideal self and *ought-to self* to the field of language learning motivation, and developed a new measure of L2 motivation called the L2 motivational self-system (Dörnyei, 2005, 2009).

As concepts, ideal and ought-to selves are included in a superordinate concept of *possible selves*. According to Markus and Nurius (1986), an individual's possible selves are intimately connected to his or her personal significant hopes, fears, and fantasies. Unlike the other self-concepts, possible selves are intrinsically "future-oriented" (Carver, Reynolds, & Scheier, 1994, p. 134), and "provide a link between the self-concept and motivation" (Oyserman & Markus, 1990, p. 113). According to Higgins, Roney, Crowe, and Hymes (1994), the ideal self is based on the hopes and wishes of the individual, while the ought-to self is based on duty and obligations. These concepts have a self-regulatory function, working to reduce the discrepancy between the desired image and the current self or to increase the discrepancy between the undesired image and the current self (Higgins, 1987, 1996; Higgins et al., 1994). Dörnyei developed the L2 motivational self-system focusing on the relationship between these self-regulatory functions and their respective motivational effects (Dörnyei, 2005).

The L2 motivational self-system consists of three components: the ideal L2 self, ought-to L2 self, and *L2 learning experience*. The ideal L2 self refers to a positive image held by an individual of him- or herself using the target language in the future, expected to motivate L2 learners if they have a willingness to reduce the discrepancy between their actual and ideal selves. In contrast, the ought-to L2 self is a more protective, instrumental motivator that

encourages individuals to participate in L2 learning in order to avoid negative outcomes. Finally, the *L2 learning experience* concerns the influence of the learning environment and immediate or present learning experience on L2 motivation (Dörnyei, 2005). That is, in contrast to the ideal L2 and ought-to L2 selves, which concern target imagined individual future end-states, the L2 learning experience reflects influences from the learner's surroundings (Dörnyei, 2005).

In Japan, researchers have studied how these concepts influence foreign language acquisition or actual learning behavior. Irie (2008, 2011), considering how to apply the L2 motivational self-system to classroom practice, developed a questionnaire measuring the discrepancy between actual selves and ideal selves in EFL settings, and reported the reliability of the developed questionnaire. Suzuki (2011) compared the ideal L2 self of high- and low-motivated learners qualitatively and quantitatively; her results indicated that the ideal L2 self of both high- and low-motivated learners is related to linguistic self-confidence; low-motivated learners' ideal L2 self was incompetent and unskilled. She also introduced two types of the ideal L2 self of high-motivated learners: the near-native self, which is distant from the actual self, and the less skillful and agreeable ideal L2 self, which may be achievable. Ueki and Takeuchi (2012) conducted a validation of the L2 motivational self-system in a Japanese EFL context, and concluded from the results that the ideal L2 self has a strong impact on motivated learning behavior and that providing information about learners' future self-guides will promote a strong ideal L2 self. Takahashi (2012) investigated how learners develop their ideal L2 self in rural Japan, where learners do not have

many opportunities to communicate in English. She concluded that students do not hold any ideal L2 self and suggested that English educators inform students of the relevance of English learning and work. Sugawara (2012) also used the L2 motivational self-system, as well as international posture and other variables, to establish a model representing links among factors influencing acquisition in Japanese learners of English. From the results, he concluded that it was important to provide integrative learning opportunities relating to the students' majors or professional specialties in order to enhance their ideal L2 selves in their possible future professions.

The concepts of the ideal and ought-to L2 selves consider the imaginative capacity of learners and the dynamic process of individuals changing from a present state to the future (Yashima, 2013). In this dissertation, the author discusses trying to use the concept of "imagined international discourse community" in her educational intervention to facilitate engineering students' image as future engineers and to promote their motivation to learn English. These concepts may constitute an appropriate framework for the study of Japanese engineering students' motivation to learn English. If engineering students possess a clear image of their use of English in future professional settings and its utility to them, they will include English as part of the picture when attempting to formulate an ideal (professional) self-image. They may then realize that to achieve this ideal image, they need to learn English, and must therefore set clearer goals and maintain motivation to learn the language.

2.2.4.2 Self-determination theory

Self-determination theory (SDT) was developed by Deci and Ryan (e.g., Deci & Ryan, 1985, 2000; Deci et al., 1991). While under Dörnyei's L2 motivational self-system the ideal and ought-to selves regulate the individual's image of his or her future self, SDT postulates that human beings have a natural tendency to actively engage in either personal or interpersonal activities that interest them (Deci & Ryan, 2000), and that humans possess an innate tendency to regulate their own behavior through interaction with their environment and social world (Noels, 2009; Ryan & Deci, 2002). Therefore, they will be motivated by a situation in which their three basic psychological needs—autonomy, competence, and relatedness—are satisfied. *Autonomy* here refers to self-organization and self-regulation (Deci & Ryan, 2000), and to the willingness of an individual to autonomously participate in learning activity. *Competence* is the learner's sense of confidence and effectiveness. The need for self-perception of competence may lead individuals to challenge themselves with activities that may exercise or develop their skills and capacities (Ryan & Deci, 2002). Finally, *relatedness* is a feeling of connection to others that stems from the sense of belonging that individuals feel with regard to others and their community (Ryan & Deci, 2002).

In SDT, *intrinsic motivation* is said to lead individuals to participate in activities for pleasure and satisfaction (Noels, Clément, & Pelletier, 1999). Thus, English learners who learn for satisfaction or the innate pleasure of knowledge may be said to be intrinsically motivated. In contrast, *extrinsic motivation* is defined by the degree to which individuals internalize and self-determine an activity and set to four levels: external, introjected,

identified, and integrated. *External regulation* is a state in which individuals study to do well on their exams or because of other pressures from outside; *introjected regulation* is a state in which individuals study due to internal pressure and anxiety; and *identified regulation* is a state in which individuals study because they consider that speaking the language is necessary to achieve their goals; *integrated regulation* is a state in which individuals study the most autonomously as much as possible because using the language is valuable and a part of the self. The additional concept of *amotivation* refers to cases in which individuals lose the sense of meaning and interest in participating in an activity (Deci & Ryan, 2000). Using these concepts, SDT allows researchers to model the changing processes of self-determination of behavior.

In Japan, SDT has frequently been used in studies of English learning motivation, since it allows the process of motivational change and the factors involved to be more clearly understood. Some researchers have used this theory to understand learners' motivational tendencies and factors affecting them (Hayashi, 2005, 2009; Hiromori, 2004, 2005; Nakahira, Yashima, & Maekawa, 2010; Sumida, Nonaka, & Seki, 2010). The theory has been applied especially in interventional studies assessing motivational change through the use of project-based teaching or other instructional methods. For instance, Hiromori (2006a) assessed the effects of a writing task designed to satisfy the three psychological needs mentioned above (autonomy, competence, and relatedness) and found that these needs needed to be addressed to foster motivational growth in ways that accorded with the level of self-determination in a pre-survey. The findings showed that the satisfaction

of these three needs is important for the development of intrinsic motivation. Similarly, Tanaka and Hiromori (2007) assessed the motivational effects of group presentations and found that learners with low intrinsic motivation in a pre-survey showed motivational growth after their presentations, and that group activity satisfied their psychological need for autonomy. As another example, Nishida and Yashima (2009a) examined how musical projects enhance elementary school students' intrinsic L2 motivation and willingness to communicate. The results showed significant changes in autonomy and competence after the projects, and demonstrated that these qualities affected intrinsic motivation. Finally, Tanaka (2013) experimentally tested the effects of communication activity using TV programs and movies from English-speaking countries as listening and conversation practice materials. The results showed that these activities satisfied the three psychological needs, and in so doing, influenced the trait-level motivation of learners, causing them to gain confidence. Taken together, these studies suggest that project-based instruction should have positive effects on the motivation of students to learn English when the instructional approach and execution meet the needs of students or are considered interesting.

While the concepts of the ideal and ought-to L2 selves consider motivation from the point of view of learners' future self-image, SDT concerns the present states of motivation focusing on the extent to which learners internalize the learning and to what degree the learning is self-determined. This aspect of SDT helped the researcher to investigate the process of engineering students' motivational changes during the course of an English presentation-based curriculum, which was designed to help learners

envision themselves participating in the imagined international discourse community.

2.3 Research objectives of this study

On the basis of the literature review above, the research discussed in this thesis investigated the effects of English-language presentation activities, where engineering students introduce some machinery or technical product used in the field, as an example of an imagined international discourse community created in the classroom for engineering students. I set the following research objectives:

1) Examining whether there are relationships between engineering students' self-images as future engineers and those as English users and between their self-images as future engineers and their motivation to learn English (Study 1).
2) Assessing the effects of an English presentation-based course on engineering students' L2 learning motivation, and examining changes in their ideal and ought-to self-images as English users as a result (Study 2).
3) Examining the process and mechanism of motivational changes among engineering students taking an English presentation-based course (Study 3).
4) Exploring more microscopically how English presentation activities served as an imagined international discourse community (Study 4).

A brief description of each study follows.

Study 1 examined if there is a relationship between the engineering students' future career plans and their self-image as English users and

between their future career plans and their current English learning motivation. (Cross-sectional quantitative study.)

Study 2 examined the motivational effect on engineering students of an English presentation-based course, specially designed for the study, using Dörnyei's L2 motivational self-system. (Longitudinal quantitative study.)

Study 3: Examines the effect of an English presentation-based course on engineering students' self-image as English users (Dörnyei's L2 motivational self-system) and the process of motivational changes through the curriculum (self-determination theory). (Longitudinal quantitative study.)

Study 4 examined students' self-reflection of English presentation activities and changes in their awareness and effort over time in relation to the use of English and the content of the class. (Longitudinal qualitative and partially quantitative study.)

I expect that these studies will contribute to accumulation of empirical data that can help us understand the motivational tendencies of Japanese engineering students in English classrooms and to foster positive motivational changes through educational intervention. The study design is set out in Figure 2-1.

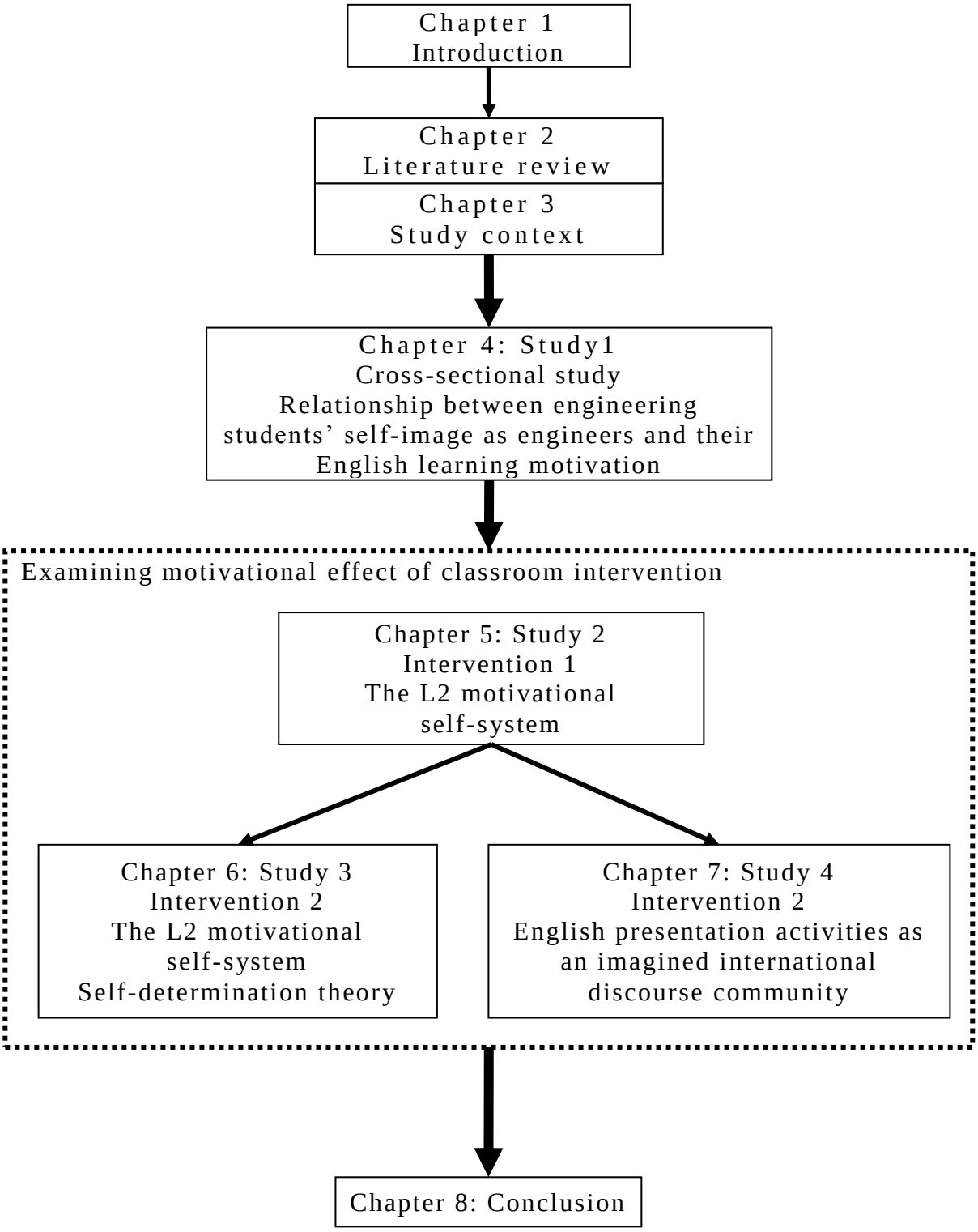

Figure 2-1. Study Design.

3. Study Context

This chapter introduces the study site, background information on the Technical English courses in which the studies were conducted, the design of the curriculum, and the author's stance in the study site.

3.1 Study site

The studies described in this thesis were conducted at the school of science and engineering at a private university in Tokyo. This university is more reputed for its liberal arts programs than for those in science and engineering. Students enrolled in the science and engineering department belong to a campus that is separate from the main campus located in central Tokyo. Many students of this university are from relatively prosperous families; moreover, approximately 3% of the science and engineering students are from the affiliated high school. Although most students study diligently, they also enjoy extracurricular activities. In this university, 30% to 45% of the graduates from the school of science and engineering will go on to a graduate school, and approximately 60% of them will find a job. The author started her teaching career at this university and struggled to establish a better curriculum for the students before beginning her research. Studies examining students' motivation helped her to understand the students and to evaluate her own instruction and improve instructional content.

3.2 Technical English course

The Technical English courses at this university were established by engineering professors. In 1996, professors in the mechanical engineering

department created a class called *Engineering English* for students majoring in mechanical engineering. After the reorganization of the school of science and engineering in 2000, the name of the class was changed to *Technical English*, and it was made available to students in three reformed departments: mechanical engineering, industrial and systems engineering, and information technology. Since that time, professors of the mechanical engineering department have repeatedly encouraged students to take Technical English courses and emphasized the importance of English for future engineers. This fact shows how interested the engineering professors are in English education for their students as implemented through this class.

All the technical English instructors have been part-time; there were six instructors at the time when the author was working as one. Most of these instructors were members of Japan society for technical communication and were professionals working as technical translators, examination designers for an engineering English writing test (the Kogyo-eiken), which is a certificate test that approves individuals' knowledge of technical terms and skills of technical translation, and lecturers in technical translation courses at other institutions.

The instructors were allowed free rein in terms of class design, and they conducted their classes individually. However, they often discussed the course together and shared their instructional ideas and class content with one another. Further, they also had some opportunities to discuss the class with engineering professors in the department. When the author was working in this position, all instructors taught one-year courses of Technical English I (TEI), for second-year students, and Technical English II (TEII), for

third-year students. To allow students to experience different approaches to instruction, the system was designed so that students would not have the same instructor for both courses. These courses were electives but counted for required English credits.

3.3 Curriculum design

Given the situation described above, the author decided to assign students the task of creating a series of presentations on introducing engineering technologies or machinery products in English; these presentations became the central activity of a year-long Technical English course (both TEI and TEII). English presentation activities were implemented for several reasons. First, the engineering professors had requested that we provide training in English presentation skills. Second, many English self-study books aimed at engineers (e.g., Campbell, 1995; Davis, 2005; Raman & Sharma, 2008) have suggested that numerous opportunities exist in the field to give presentations in English, which highlights the importance of possessing the skills to communicate knowledge and information in presentation form in this language. Third, students who had previously enrolled in this class expressed higher motivation for and interest in presentation activities than in writing activities.

Table 3-1 details the curriculum design of a one-year presentation-based technical English course. During the academic year, the students had four opportunities (in May, July, November, and December) to give a 5-10 minute speech introducing an engineering or machinery product from their area of interest or their dream machine. To make TEII more advanced than

TEI, the author encouraged TEII students to introduce their dream machine and to research related technology and the theory for developing it. Overtime, the presentation themes changed to ensure increasing complexity of presentation content in such a way that the students would be compelled to imagine specific situations where they would use English. In other words, through this activity, the students would develop clearer images of themselves using English. The instructions aligned to the presentation theme and goal. The instructor (author) also used a textbook, *Presenting Science* (Kiggell, Cleary, Hitomi, Yoshida, & Yubune, 2005, 2008), to introduce basic technical terms, useful expressions, and tips for preparing presentations. As described in Table 3-1, class instruction consisted of introducing a language focus, improving English prosody, and steps to prepare the presentations.

Table 3-1

Curriculum Design of a One-Year Presentation-Based Technical English Course: Presentation Theme, Topic Introduced in the Textbook, and Instruction Content for Each Presentation.

Presentation			Instruction Content		
Date	Theme	Textbook Topic	Language focus	Prosody	Presentation Preparation
May	Introduction of a product	Vehicles Space station Thermometer scales	Describing objects (shape, position, adjectives) Numbering and counting, reading equations Measuring, explaining size	Stressing important words Pronouncing linking words Rising or falling intonation	Speech techniques (voice, eye contact, posture) Choosing topics (brainstorming) Researching necessary information
July	Comparison with similar products	Combustion engine Types of bridges Ruby laser	Cause and effect Comparing and contrasting Defining sentences Avoiding direct translation	Pauses and chunks of words Tone and meaning	Structure of presentation and typical phrases Clarity of message Effective use of visual aids
November	Manual or process	Experiment Pinhole camera Electroplating	Instructing sentences Transition words Logical explanations Using a dictionary and choosing appropriate vocabulary	Changing pace of speaking	Researching and attracting audience Organizing a presentation
December	Business presentations	Gravity Experiment (2) Experiment (3)	Timing of actions/events Expressions for explaining experiments Expressions for explaining graphs and tables	Maintaining rhythm and inflection	Product design and target group Possible business presentation situation and audience interest

The theme of the May presentation was introduction of a product, in which the students had to individually introduce the basic features and appearance of their chosen product. The author aimed to help the students discover their strengths and weaknesses with regard to giving presentations and how they performed in public speaking situations. Therefore, the presentations were video-recorded and later shown to them. To prepare the students for the presentations, the instruction emphasized teaching of basic science-related vocabulary, basic tips of English delivery, presentation techniques, and choosing topics and information.

In July, the theme was comparing two or more similar products, and the students were allowed to choose to present individually, in pairs, or in groups of three. In preparation for the July presentation, the language and grammar instruction focused on sentence structures, such as cause and effect, comparison, and definition. English delivery instruction focused on delivering clear message in English; preparation instruction for the presentation concerned the basic structure of a presentation, delivering a clear message, and using visual aids. The aim of the July presentation was learning how to communicate information clearly and creating awareness about the importance and effectiveness of different styles. The author also taught the students how to avoid direct translation when composing English scripts by showing students' common mistakes as examples.

In the fall semester (November and December), the author instructed students to imagine themselves giving a presentation in a professional situation. The theme of the November presentation was introducing the operation manual or the development process of the chosen product. This

theme was selected to provide the students with a clearer image of English use in an engineering community, for instance, in situations where reading and writing manuals may be important for operating machines and conducting experiments. Thus, language instruction mainly focused on writing logical and clear instructions by using imperative sentences and transition words. The instruction for the November presentation focused on the importance of understanding the audience and organizing a speech to maintain audience interest. To improve English delivery, changes in pace of speaking were introduced. Based on students' common mistakes, there were also instructions on how to use a dictionary and choose appropriate vocabulary.

The theme for the December presentation was business, in which the students pretended to be business persons and gave presentations as either salespersons, product designers, developers, or researchers in this imagined situation. The students were asked to create a hypothetical situation for their presentation. The presentation aimed to make the students aware of the steps involved in designing a product, understanding how a business functions, and the importance of audience interest. In order to create an actual business setting, the students were asked to wear business suits. Moreover, the presentation was video-recorded and shown to the students so that they could evaluate their own performance and growth objectively. The language instruction focused on expressions used to explain experiments, graphs, and tables. In preparation for the presentation, the relationship between the product and its target group was introduced. The exercise enabled the students to participate in a simulated business setting and to consider how different target groups and audiences would influence their presentation content. With

regard to English delivery, rhythm and inflection were focused on.

After each presentation, the students were required to submit a learning self-record sheet (Appendix D) that contained the goals of each presentation, details of the work they had done in preparation for the presentation, and reflections on their actual performance after the completion of each presentation. Further, the students also evaluated and commented on the performance, content, and clarity of each of their classmates' presentations. These results and comments were typed and returned to each presenter, along with the instructor's scores for performance, content, clarity, structure, and preparation. The presentation scripts were evaluated separately for content, structure, vocabulary choice, language usage, and mechanics. As the instructor of the course, the present author expected that this feedback would help the students become aware of what kind of language ability they would need in the future, identify their strengths and weaknesses, and improve their performance.

As described above, the author chose English presentation activities and tried to create an imagined international discourse community for engineering students, where they could visualize how they would integrate and use engineering and English knowledge in their professional lives in the future. According to Wenger (1998), imagination "concerns the production of images of the self and images of the world that transcend engagement" (p. 177). Especially in the last presentation, the students were encouraged to decide on the audience and situations of their presentation so that they could choose appropriate content and language by considering the knowledge and interests of their audience. The students were also asked to select the target group for their product development presentation so that they could

understand the steps and important elements involved in designing a product that fulfilled the needs and interests of the target group. By imagining the audience, situation, and target group, the students could create new images of themselves as members of an imagined future English-speaking community. These new images could help them rework their ideal L2 self-image and language learning goals accordingly.

3.4 The author's stance

The author taught Technical English classes for students majoring in mechanical engineering as a part-time instructor at the site university for 10 years, during academic years 2001 to 2010. Further, the author graduated from the mechanical engineering department of the same university and was one of the last students there who did not take *Engineering English*. Therefore, most professors in the mechanical engineering department knew her as a graduate, and she had maintained a fairly close relationship with the engineering professors and students. Moreover, she had quite a bit of knowledge of the students' specialized field and could understand and relate to what the students were learning.

3.5 Summary

In this chapter, background information on the field of study and curriculum design for the course in which this research was conducted were introduced. In the next chapter, the first study, a cross-sectional survey to examine the relationship between engineering students' career goals and their English learning motivation, will be described.

4. Study 1

This chapter describes Study 1, which was conducted to investigate how engineering students' self-image as future engineers relates to their self-image as English users and their English learning motivation using a cross-sectional survey. It is possible that students who have established clear career goals also assume that learning English is important. A cross-sectional study is appropriate to investigate relationships between different variables with a large number of participants and find trends of the participant group. This study may also show a characteristic of students in this study site.

4.1 Research objectives and questions

Although the main objective of the research described in this thesis was to assess engineering students' motivational changes through a project-based educational intervention, the first study aimed to reveal how students' self-image as future engineers relates to their motivation to learn English and to understand general motivational tendencies of students who are enrolled in technical English classes. Therefore, the following research questions regarding engineering students were posed: 1) In terms of the L2 motivational self-system, how do engineering students identify themselves as English users? 2) In terms of self-determination theory, what motivational tendencies do engineering students exhibit? 3) What types of attitudes and motivation do they exhibit towards learning their specialization? 4) How do their self-images as future engineers influence their self-image as English users? 5) How do their self-images as future engineers influence their motivation to learn English?

4.2 Study

4.2.1 Participants and colleagues

Five part-time instructors of technical English (TE) agreed to cooperate and conduct the present survey in their classrooms. Three of them taught both TEI and TEII and conducted the survey in both classrooms, while the other two taught only TEI. Total 310 of students majoring in mechanical engineering, industrial and systems engineering, and information technology participated. Incomplete questionnaires and those marked identically throughout were excluded because their answers may interfere with the reliability of the results, leaving a total of 251 (Table 4-1).

Table 4-1

Participants

	TEI		TEII		
Major	Female	Male	Female	Male	Total
Mechanical	6 (6)	73 (66)	4 (4)	23 (18)	106 (94)
Industrial	17 (11)	54 (39)	6 (6)	20 (19)	97 (75)
Information	14 (11)	59 (46)	1 (1)	33 (24)	107 (82)
Total	37 (28)	181 (151)	11 (11)	76 (61)	310 (251)

Note. Mechanical = mechanical engineering; Industrial = industrial and systems engineering; Information = information technology. ( ) indicate numbers after deleting incomplete questionnaires and those marked identically throughout.

4.2.2 Procedure

A questionnaire survey was prepared in Japanese (see Appendix A) at the beginning of the September 2011 academic year and distributed and collected by each classroom's respective instructor. An explanation of the purpose and intended use of the collected data was provided alongside the

questionnaire. Furthermore, the instructors were requested to inform the students that their participation was strictly voluntary. To reassure the participants that the survey would not affect their class grade, no identifying details, such as student ID number and grade, were collected.

4. 2. 3 Materials

The questionnaire sheet used in this study consists of three sets of questionnaires: *English learning motivational/attitudinal questionnaire* based on the L2 motivational self-system for investigating engineering students' self-image as English users, *English learning motivational regulations* based on self-determination theory for assessing engineering students' motivational tendencies, and *motivation and attitudes towards studying one's specialization* for determining engineering students' self-image as future engineers. This section introduces each questionnaire in detail.

1. English learning motivational/attitudinal questionnaire (20 items, 5-point scale; Ryan, 2008; Appendix A-1)

Based on prior studies and questionnaires conducted by Dörnyei and his colleagues (e.g., Dörnyei & Clément, 2001; Dörnyei, Csizér, & Németh, 2006), Ryan (2008, 2009) developed the Motivational Factors Questionnaire (MFQ) and adapted it for use within a Japanese context referring especially to Yashima (2000, 2002) and Nakata (2006). Since this questionnaire is a part of three sets of questionnaires, duplicating Ryan's procedure, comprising 100 items and 17 variables, may overabound and impose a strain on participants. Therefore, 20 items and five variables, which related specifically to

components of the L2 motivational self-system, were selected. The variables were as follows: ideal L2 self (six items), ought-to L2 self (five items), attitudes towards learning English (four items), linguistic self-confidence (three items), and English classroom anxiety (two items).

Ideal L2 self: This variable is at the core of the L2 motivational self-system. Six items attempted to assess how individuals expected to use English in the future. “I often imagine myself as someone who is able to speak English” and “I can imagine speaking English with international friends” are two sample prompts.

Ought-to L2 self: This is another important component of the L2 motivational self-system. Five items indexed the necessity participants felt to learn English (e.g., “For me to become an educated person, I should learn English,” and “Knowledge of English would make me a more educated person.”)

Attitudes towards learning English: According to Ryan (2008), this variable is an important element of both Gardner’s socio-educational model and Dörnyei’s L2 motivational self-system since it represents how individuals regard learning situations. Four items were intended to measure participants’ overall interest in learning English; “Learning English is really great” is an example of one included prompt.

Linguistic self-confidence: Ryan (2008) asserts that L2 learning experience, which is one component of the L2 motivational self-system, relates to “[an] individual’s perceptions of current competence in the L2” (p. 115). Three items assessed learners’ confidence and asked them to respond to a statement such as “I am sure I will be able to learn a foreign language.”

English classroom anxiety: Like attitudes towards learning English, this variable assesses an individual's perception towards a learning situation. Two items were designed to gauge individuals' levels of anxiety when using English in the classroom. For example, the students were asked to rate the following statement: "I always feel that my classmates speak English better than I do."

2. English learning motivational regulations based on self-determination theory[1] (25 items, 5-point scale; Hiromori, 2006b; Appendix A-2)

Based on studies and questionnaires conducted by Noels (2001) and Noels et al. (2000), Hiromori (2006b) devised the following five sets of regulations for Japanese learners of English, each comprising five items:

Intrinsic motivation: This regulation indicates the highest level of self-determination and reflects the extent to which students enjoy learning English (e.g., "Studying English is fun").

Identified regulation: This regulation is a component of external motivation, but presupposes a high level of self-determination. Students in this category perceive learning English to be a necessary and important task, and assume an active role in doing so (e.g., "It is important to have English skills").

Introjected regulation: This regulation generally examines learners' self-esteem. Individuals within this category study English to avoid negative assessments (e.g., "I want my teacher to think of me as a good student").

External regulation: Individuals in this state exhibit minimal self-determination and study English due to outside pressure or for specific

rewards (e.g., “One has to study English in this society”).

Amotivation: This regulation is indicative of no motivation. Students in this state consider learning English a meaningless endeavor and subsequently refuse to study it (e.g., “I do not understand why I have to study English”).

3. Motivations and attitudes towards studying one’s specialization (20 items, 5-point scale; Appendix A-3)

A questionnaire was developed to assess students’ interest in their respective fields, referring to the English learning motivational/attitudinal questionnaire survey introduced in 4.2.3-1. The author modified the variables of the ideal L2 self, the ought-to L2 self, attitudes towards learning English, linguistic self-confidence, and English classroom anxiety so that each variable fits in situations of learning their specialized field. This questionnaire measured the extent to which students self-identified as engineers, and any subsequent correlations between individual identity and English learning motivation. The questionnaire items are as follows:

- My specialization is interesting.
- I should seek employment that makes use of my specialization.
- I get nervous when my coursework is graded.
- I often imagine myself working (researching) as an engineer.
- I am confident in studying my specialization.
- If I accept a job unrelated to my specialization, those close to me will be disappointed.
- In classes pertaining to my major, I get nervous if my classmates consider that I do not understand the content.

- I enjoy studying my specialization.
- The things I want to do in the future require me to study subjects in my major.
- There is a specific occupation I want to pursue.
- I always get good grades in papers and assignments of my specialization.
- There are topics in my specialization that I enjoy.
- Obtaining an engineering degree does not mean that I must become an engineer.
- My plans following graduation are certain.
- I find subjects within my specialization difficult.
- I believe I will utilize knowledge of my specialization.
- To get a good job, I must focus on my specialization.
- If I made the effort, I could understand subjects within my specialization.
- It is not mandatory to find employment involving my specialization.
- In classes pertaining to my major, other students seem to grasp the material more easily than I do.

4.3 Analyses and results

Data analysis was conducted using SPSS 16.0. First, the author tested the reliability of each component and conducted factor analysis for questionnaires on motivation and attitudes towards studying one's specialization. Next, to determine the relationships between the students' self-images as future engineers and their self-images as English users or English learning motivational regulations, correlations between the components provided in each questionnaire and factors were examined.

4.3.1 Component reliability and factor analysis

4.3.1.1 English learning motivational/attitudinal variables

Before examining the reliability of each component, the descriptive statistics of each item were verified and it was determined that one item belonging to the ideal L2 self ("When I think about my future, it is important that I use English") exhibited a ceiling effect. Nevertheless, this item was included in the results and retained within the component because this result may also indicate the characteristic of participants. Although the categories were generally in accordance with Ryan's (2009), English classroom anxiety was omitted since the Cronbach's alpha was only .37. The Cronbach's alphas of the ought-to L2 self and linguistic self-confidence were not very large, either. However, the author used these variables because the Cronbach's alphas did not improve significantly after deleting suggested items. Moreover, it is expected that lower Cronbach's alphas are observed with short scales of 3-4 items, and the Cronbach's alpha of .60 can be slightly above the border (Dörnyei, 2007). Table 4-2 shows the mean scores and standard deviations for items under the subscales of motivational variables, and the Cronbach's alpha for each. The results revealed that the mean of the ought-to L2 self was the highest, followed by that of the ideal L2 self.

Table 4-2

Mean Scores, Standard Deviations, and Cronbach's Alpha of Each English Learning Motivational/Attitudinal Variable (N = 251)

	M (*SD*)	α
Ideal L2 self	3.08(.80)	.81
Ought-to L2 self	3.55(.60)	.61
Attitudes towards learning English	2.87(.78)	.80
Linguistic self-confidence	2.81(.77)	.60
English classroom anxiety	-	.37

4.3.1.2 English learning motivational regulations

The descriptive statistics of each item showed neither ceiling nor floor effects. Hiromori's (2006b) categories were applied. Although the Cronbach's alphas of introjected (.50) and external regulations (.51) were insufficient, neither category improved significantly following the elimination of certain items. In self-determination theory, every motivational regulation is indispensable, because each regulation represents a different level at which individuals internalized their motivation and self-determined to engage in the activity and forms a continuum with the other levels (Ryan & Deci, 2002). Moreover, former studies suggested a tendency of introjected regulation scoring lower Cronbach's alpha than the other regulations (Hayashi, 2009; Hiromori, 2006b). Thus, both introjected and external regulations were included as Hiromori (2006b) did despite insufficient Cronbach's alpha. Table 4-3 presents the mean scores, standard deviations, and Cronbach's alpha of the given subscales. The results revealed that identified regulation had the highest mean score, while intrinsic motivation and amotivation were relatively low.

Table 4-3

Mean Scores, Standard Deviations, and Cronbach's Alpha of Each English Learning Motivational Regulation (N = 251)

	M (*SD*)	α
Intrinsic motivation	2.85 (.79)	.86
Identified regulation	3.76 (.76)	.85
Introjected regulation	2.99 (.59)	.50
External regulation	3.16 (.60)	.51
Amotivation	2.62 (.70)	.75

4.3.1.3 Motivation and attitudes concerning one's specialization

This questionnaire was created based on the work of Ryan (2009) and modified to measure the participants' attitudes and motivation towards learning their specialization. Since it is possible that categorization could differ between English motivational/attitudinal questionnaire and motivation and attitudes concerning one's specialization, an exploratory factor analysis was conducted on motivation and attitudes concerning one's specialization questionnaire. A principal factor analysis was initiated first, resulting in the extraction of five factors. After eliminating three items with less than a 0.4 loading for all the factors, maximum likelihood factor analysis was conducted with promax rotation, and two additional items with less than a 0.4 loading for all the factors were eliminated. After repeating the same procedure and removing one more item, four factors suggested by the data were used and showed a sufficient Cronbach's alpha. The four factors are as follows: interest in engineering materials (Factor 1), ought-to professional self (Factor 2), ideal professional self (Factor 3), and anxiety concerning the field of engineering (Factor 4). Table 4-4 introduces the mean scores, standard

deviations, Cronbach's alpha for each factor, and correlations between the factors, while Table 4-5 presents results from the final factor analysis. The mean score of anxiety concerning the field of engineering was the highest, followed by interest in engineering materials. From the correlation analysis, ideal professional self exhibited positive correlation with interest in the engineering field and slightly positive correlation with the ought-to professional self, while the other factors did not exhibit meaningful correlations with each other.

Table 4-4

Mean Scores, Standard Deviations, and Cronbach's Alphas for Each Subscale of Motivational/Attitudinal Variables for Engineering Materials and Correlations Between Each Item (N = 251)

	M (*SD*)	α	IEM	OPS	IPS	ACFE
IEM	3.37 (.90)	.83	-			
OPS	2.51 (.84)	.72	.09	-		
IPS	2.88 (.96)	.73	.45***	.25**	-	
ACFE	3.57 (.71)	.61	.17**	.10	.15*	-

Note. IEM = interest in engineering materials; OPS = ought-to professional self; IPS = ideal professional self; ACFE = anxiety concerning the field of engineering.
* $p < .05$, ** $p < .01$, ***$p < .001$

Table 4-5

Results From the Factor Analysis of Motivational/Attitudinal Variables for Engineering Materials (Promax Rotation, Maximum Likelihood Method, N = 251)

	Items	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Factor 1: Interest in engineering materials						
8	I enjoy studying my specialization	**.95**	-.06	-.03	-.09	.80
1	My specialization is interesting	**.85**	-.05	-.03	.01	.70
12	There are topics in my specialization that I enjoy.	**.69**	-.09	.14	-.16	.51
Factor 2: Ought-to professional self						
19	* It is not mandatory to find employment involving my specialization.	-.06	**.81**	.07	-.21	.65
13	*Obtaining an engineering degree does not mean that I must become an engineer.	-.10	**.75**	-.04	-.12	.52
6	If I accept a job unrelated to my specialization, those close to me will be disappointed.	-.09	**.53**	.01	.05	.28
2	I should seek employment that makes use of my specialization.	.15	**.48**	-.06	.34	.48
Factor 3: Ideal professional self						
10	There is a specific occupation I want to pursue.	.05	-.06	**.78**	.09	.67
14	My plans following graduation are certain.	-.02	.02	**.76**	-.13	.55
16	I believe I will utilize knowledge of my specialization.	.11	.21	**.43**	.19	.33
Factor 4: Anxiety concerning the field of engineering						
15	I find subjects within my specialization difficult.	-.22	-.12	.02	**.63**	.44
17	To get a good job, I must focus on my specialization.	.20	.05	.01	**.63**	.56
20	In classes pertaining to my major, other students seem to grasp the material more easily than me.	-.20	-.19	.08	**.52**	.24
3	I get nervous when my coursework is graded.	.10	.07	-.12	**.48**	.28

Correlation factor matrix	Factor 1	Factor 2	Factor 3	Factor 4
1. Interest in engineering materials	-			
2 .Ought-to professional self	.23	-		
3. Ideal professional self	.48	.26	-	
4. Anxiety concerning the field of engineering	.39	.21	.18	-

Note. Factor loadings > .40 are in boldface.

4.3.2 The relationship between attitude to/motivation for learning English and enthusiasm for one's specialization

Using the variables provided above, correlation analysis was performed to determine how one's motivation and attitudes towards engineering materials related to their motivation and attitudes to learning English. Table 4-6 shows the correlations between motivational/attitudinal variables for learning English and those for learning engineering materials.

The results indicated that interest in engineering materials had a significantly positive correlation with the ought-to L2 self. The ideal professional self correlated positively with the ideal L2 self. Anxiety concerning the field of engineering exhibited a significantly negative correlation with linguistic self-confidence, but correlated positively with the ought-to L2 self.

Table 4-6

Correlations Between Motivational/Attitudinal Variables for Learning English and Engineering Materials

	IL2S	OL2S	ATLE	LSC
IEM	.14*	.24**	.05	-.04
OPS	-.03	.03	-.07	-.12
IPS	.27**	.16*	.15*	.04
ACFE	.06	.20**	-.07	-.23**

Note. N = 251. IL2S = ideal L2 self; OL2S = ought-to L2 self; ATLE = attitudes towards learning English; LSC = linguistic self-confidence; IEM = interest in engineering materials; OPS = ought-to professional self; IPS = ideal professional self; ACFE = anxiety concerning the field of engineering. * $p < .05$, ** $p < .01$

The ideal L2 self and the ought-to L2 self represent the learner's self-images as an English user in future states (Dörnyei, 2005). Since engineering students' self-image as English users can be related to their future

career settings, it is expected that individuals' attitudes and motivation regarding engineering materials would affect their self-image as an English user, which means the ideal L2 self and the ought-to L2 self could be predicted from the motivational/attitudinal variables of engineering materials. Therefore, multiple regression analysis was performed with the ideal L2 self and the ought-to L2 self set as dependent variables. The independent variables included all of the motivational/attitudinal variables for engineering materials: interest in engineering materials, the ought-to professional self, the ideal professional self, and anxiety concerning the field of engineering (Table 4-7). The coefficient of determination (R^2) was low, but it may be possible to interpret relationships between the motivational/attitudinal variables and the ideal L2 self and/or the ought-to L2 self. The predictor for the ideal L2 self was the ideal professional self (β = .28, p < .001). For the ought-to L2 self, interest in engineering materials (β = .19, p < .01) and anxiety concerning the field of engineering (β = .16, p < .05) were the predictors.

Table 4-7

Results of Multiple Regression Analysis 1 (N = 251)

	Ideal L2 self		Ought-to L2 self	
	Standardized β	p	Standardized β	p
IEM	0.02	.788	0.19	.006
OPS	-0.10	.099	-0.01	.871
IPS	0.28	.000	0.05	.508
ACFE	0.02	.691	0.16	.012
R^2	0.08		0.08	
F	5.54		5.62	

Note. Independent variables: all of the motivational/attitudinal variables for engineering materials. Dependent variables: ideal L2 self and ought-to L2 self. IEM = interest in engineering materials; OPS = ought-to professional self; IPS = ideal professional self; ACFE = anxiety concerning the field of engineering.

4.3.3 The relationship between English learning motivational regulations and enthusiasm for one's specialization

Like in the analysis above (4.3.2), correlation analysis was performed to determine how one's motivation and attitudes towards engineering materials relate with the motivation to learn English. Table 4-8 shows the correlations between English learning motivational regulations based on SDT and motivational/attitudinal variables for engineering materials.

The results indicated that interest in engineering materials had a positive correlation with identified regulation. The ought-to professional self correlated positively with introjected regulation and external regulation. Anxiety concerning the field of engineering correlated positively with identified regulation, introjected regulation, and external regulation. None of motivational/attitudinal variables for engineering materials showed significant correlation with intrinsic motivation.

Table 4-8

Correlation Between English Learning Motivational Regulation and Motivational/Attitudinal Variables for Engineering Materials

	Intrinsic	Identified	Introjected	External	Amotivation
IEM	.07	.24**	.05	.07	-.03
OPS	-.09	.02	.24**	.22**	.17**
IPS	.12	.19**	.14*	.07	.00
ACFE	-.05	.26**	.22**	.35**	-.07

Note. N = 251. IEM = interest in engineering materials; OPS = ought-to professional self; IPS = ideal professional self; ACFE = anxiety concerning the field of engineering. * $p < .05$, ** $p < .01$

Among the English learning motivational regulations, those

concerning extrinsic motivation (identified regulation, introjected regulation, and external regulation) exhibited significant correlations with two or more motivational/attitudinal variables for engineering materials. Multiple regression analysis was performed setting those regulations as dependent variables. Independent variables included all of motivational/attitudinal variables for engineering materials: interest in engineering materials, the ought-to professional self, the ideal professional self, and anxiety concerning the field of engineering. Table 4-9 suggests that anxiety concerning the field of engineering (β = .23, p < .001) and interest in engineering materials (β = .16, p < .05) were the predictor variables for identified regulation. Introjected regulation and external regulation had the same predictors: the ought-to professional self (β = .21, p < .01; β = .19, p < .01) for introjected and external respectively; and anxiety concerning the field of engineering (β = .19, p < .01; β = .34, p < .001) for introjected and external respectively.

Table 4-9

Results of Multiple Regression Analysis 2 (N = 251)

	Identified		Introjected		External	
	Standardized		Standardized		Standardized	
	β	p	β	p	β	p
IEM	0.16	.021	-0.03	.619	0.01	.854
OPS	-0.04	.521	0.21	.001	0.19	.002
IPS	0.09	.181	0.08	.254	-0.03	.620
ACFE	0.23	.000	0.19	.002	0.34	.000
R^2	0.11		0.10		0.16	
F	7.87		7.03		11.62	

Note. Independent variables: all of the motivational/attitudinal variables for engineering materials. Dependent variables: identified regulation, introjected regulation, and external regulation. IEM = interest in engineering materials; OPS = ought-to professional self; IPS = ideal professional self; ACFE = anxiety concerning the field of engineering.

4.4 Discussion

This chapter aimed to assess how students' self-image as future engineers related to their motivation to learn English. The research questions were as follows: 1) In terms of the L2 motivational self-system, how do engineering students identify themselves as English users? 2) In terms of self-determination theory, what motivational tendencies do engineering students exhibit? 3) What types of attitudes and motivation do they exhibit towards learning their specialization? 4) How do their self-images as future engineers influence their self-image as English users? 5) How do their self-images as future engineers influence their motivation to learn English? This section reviews the overall results of the analysis and attempts to answer these research questions.

4.4.1 Research question 1

Results from section 4.3.1 show the overall characteristics of the participants (engineering students) from the given mean scores. The mean score of the ought-to L2 self was relatively high compared to that of the ideal L2 self (see section 4.3.1.1). The ought-to L2 self represents learners' perception of the necessity to learn English while the ideal L2 self refers to individuals' hopes or dreams to use English. Therefore, the result may indicate that the engineering students in the study have developed a sense of necessity to learn English and created a certain self-image as an English user.

4.4.2 Research question 2

The result shown in section 4.3.1.2 revealed that identified regulation

was associated with the highest mean score, while intrinsic motivation was rather low. Identified regulation indicates external but highly self-determined motivation for the perceived necessity and importance of learning English. The result suggests that the engineering students are highly self-determined to learn English. They may be strongly motivated to learn English even though their motivation is not from enjoyment or interest. This result and the one shown above (section 4.4.1) suggest that these engineering students are aware of the importance of learning English and perceive the necessity of English skills, even though they are not particularly interested in doing so.

4.4.3 Research question 3

The results of section 4.3.1.3 revealed that anxiety concerning the field of engineering had the highest mean score, followed by interest in engineering materials. Correlation analysis also revealed that the ideal professional self exhibited significantly positive correlations with interest in engineering materials and the ought-to professional self; an especially strong correlation was exhibited with interest in engineering materials. This may indicate that students with a clearer self-image as a future engineer are more strongly interested in learning their specialization, and also more clearly envision the careers they intend to pursue.

4.4.4 Research question 4

From the correlation analysis shown in section 4.3.2, the ideal professional self showed a significant correlation with the ideal L2 self, suggesting that the students' clear self-image as a future engineer is related

with their self-image as an English user. The results revealed that interest in engineering materials and anxiety concerning the field of engineering had a statistically significant influence on the students' ought-to L2 self (see section 4.3.2). This indicates that students who are anxious but interested in studying their specialization believe they ought to study English for a successful career. Although the coefficient of determination (R^2) was low, it may be worth paying attention to the fact that the ideal professional self functioned as a predictor for the ideal L2 self, suggesting that students who adamantly identify as engineers also perceive proficient English use to be an ideal quality. It was also suggested that interest in engineering materials functioned as a predictor for the ought-to L2 self, which may mean that students who are enjoying learning their specialized field notice the importance of learning English. These results may also indicate that the participants' perception of a successful career in the future entails situations in which communication with English speakers will be necessary.

4.4.5 Research question 5

The results presented in section 4.3.3 revealed that intrinsic motivation did not significantly correlate with any motivational/attitudinal variables for engineering materials. This indicates that the students' self-image as future engineers does not directly relate to intrinsic motivation to learn English. However, the significant influence of interest in engineering materials and anxiety concerning the field of engineering on identified regulation were evident. Since identified regulation represents individuals' perception of necessity and importance of studying English to achieve goals,

students who are anxious but interested in studying their specialization may have positioned learning English in their pursuit of their future career; they perceive it as a necessary process for achieving their career goals, and engage in doing so actively.

For lower self-determined regulations, such as introjected and external regulations, the ought-to professional self and anxiety concerning the field of engineering held a slight influence. Thus, students who feel pressure or anxiety in their study of engineering materials may feel external pressure to study English as well. This result may suggest the existence of external pressures for engineering students to study English in order to have a successful career.

To summarize the above results, many engineering students seem to recognize a certain level of relationship between one's English skills and becoming a successful engineer. Students who have a stronger interest and awareness of their specialization tend to be more highly self-determined to learn English, which means they have internalized learning English as an important procedure for achieving their goals to a larger extent. Therefore, it is possible to say that if students can visualize their self-image as a future engineer, their motivation to learn English will be enhanced, although the motivation is rather extrinsic.

4.5 Conclusion

This study revealed that students who are interested in their specialization and clearly identify as future engineers anticipated using English throughout their careers, and subsequently recognized the importance

of studying it. Moreover, those who clearly identified with being an engineer envisioned themselves using English in the future and believed that English was necessary for a successful career. Although this study suggests that one's self-image as an engineer is not directly related to his or her intrinsic motivation to learn English, it seems to generate highly self-determined extrinsic motivation. There may be a psychological link between an individual's self-image as an engineer and vision of oneself as a user of English. Therefore, an English classroom intervention that reinforces students' self-identification as both engineers and English users may effectively motivate engineering students to learn English. As an educational intervention, English presentations that introduce new mechanical products through a fictitious international discourse were proposed in this research. Through these presentations, students may become more aware of their future careers, and discover which types of skills and language would best enhance their language proficiency in relation to their profession. Thus, this research tried to investigate whether a project-based English curriculum comprising presentation activities would effectively establish students' identities as English-speaking engineers. The chapters that follow examine engineering students' motivational changes while participating in English presentation activities.

Note

1. In designing a scale to measure the degree of internalization, Noels, Clement, and Pelletier (1999) noted that it is difficult to distinguish integrated regulation from identified regulation in foreign language learning, especially in young or novice learners, and thus reduced extrinsic motivation to three levels: external, introjected, and identified. Hiromori (2006b) developed the questionnaire following this design.

5. Study 2

This chapter introduces Study 2, which examined how presentation-based instruction influences engineering students' attitudes towards learning English. The research objectives and questions are first introduced, followed by a description of the study's methods, its results, and an overall discussion of the findings.

5.1 Research objectives and questions

Study 1 (Chapter 4) utilized a cross-sectional survey revealing that students' self-identification as engineers entailed the anticipated necessity of learning English for a successful career. As described in Chapters 2 and 3, this thesis applies English presentation activities as an example of an imagined international discourse community for engineering students. Studies 2 and 3 longitudinally examined how English presentation activities (introduced in Chapter 3) influence engineering students' English learning motivation. In this chapter, engineering students' motivation and attitudes towards learning English are determined using Dörnyei's L2 motivational self-system as a theoretical framework. The author expected that the students would establish a clear self-image of using English in their future careers, feel a sense of accomplishment, and gain confidence through experiencing English presentation activities. In turn, the students may become more interested in learning and using English. The author made and used an original can-do list (5.2.2-1) to measure students' perceived competence, which may represent how confident students are about using English in situations relevant to engineers. The research questions were as follows: 1)

How did engineering students' motivation and attitudes towards learning English change through a year-long presentation-based English course? 2) How did engineering students' perceived English competence change through a year-long presentation-based English course?

5.2 Study

5.2.1 Participants and procedure

The participants were two cohorts of second- and third-year students in the mechanical engineering department enrolled in a one-year course of Technical English I (TEI) and II (TEII) taught by the author. The second-year students were in TEI, while the third-year students were in TEII. Questionnaire surveys were distributed on the first (April) and the last (January) days of the 2007 and 2008 academic years. In 2007, 29 students were enrolled (23 in TEI and 6 in TEII); in 2008, 41 students were enrolled (30 in TEI and 11 in TEII). The questionnaires comprised a Motivational Factors Questionnaire (MFQ) created by Ryan (2009) referring to Dörnyei's L2 motivational self-system and can-do lists designed by the author based on the results of a prior open-ended questionnaire survey, which will be described in 5.2.2-1. A description of the questionnaires and their items is provided in the following section (5.2.2). The responses of students who responded identically to all the items throughout were eliminated since their answers would have interfered with the reliability of data and analysis; those who participated in only one survey were also eliminated. As a result, total 46 students participated. SPSS 16.0 was used to analyze the data.

5. 2. 2 Questionnaire

The questionnaire (Appendix B) consisted of two parts: questions related to motivation/attitudes towards learning English and those pertaining to perceived competence.

1. English learning motivational/attitudinal questionnaire (20 items, 7-point scale; Ryan, 2008;[1] Appendix B-1)

The same questionnaire from Study 1 (Chapter 4) was used. This survey was conducted earlier than Study 1. Before conducting this survey in April 2007, the author used this set of questionnaires in a pilot study conducted in January 2007 on students enrolled in all TEI and TEII classes. The questionnaire in the pilot study also included one measuring orientations in foreign language learning with a 7-point scale (Yashima, 2000). Although the original motivational factor analysis (MFQ) applied a 6-point scale (Ryan, 2008, 2009), a 7-point scale was implemented to set the median and to accommodate scale values. This questionnaire basically followed the pattern in the pilot study. The variables were as follows: the ideal L2 self (six items), the ought-to L2 self (five items), attitudes towards learning English (four items), linguistic self-confidence (three items), and English classroom anxiety (two items).

2. Perceived competence (14 items, 4-point scale, Appendix B-2)

To measure how confident students are in using English, an original can-do list was constructed. Prior to constructing the can-do list, an open-ended questionnaire survey was conducted among the students, who

were enrolled in the author's TEI and TEII classes in the 2006 academic year. The open-ended questionnaire asked the participants what they wanted or thought was necessary to learn in an English course. The results revealed that the students perceived English to be a world language, considered it necessary to learn this language as a communication tool, and were willing to learn technical terms and acquire English communication skills to facilitate their future careers. Based on these results as well as the results of the interview-based survey that the author had previously conducted among engineering professors, the can-do list items were selected to indicate several different skills that engineering students considered important. Items related to important elements of technical communication, such as the three Cs (clarity, correctness, and concision), were also included. Although a 7-point scale was used in the pilot study, conducted in January 2007, to accommodate the scale values, the pilot study result revealed a rather low profile, scoring average of 4 (the intermediate value) or below for all items and given factors. Considering the result, the author decided it would be better to use smaller and even scale-values to avoid neutral answers to this questionnaire. The questionnaire items are as follows:

- I can express what I want to say in English.
- I can understand English documents.
- I can check my English writing using a dictionary and textbooks.
- I can give a presentation in English.
- I can have a simple conversation in English.
- I can write English materials for a presentation.
- I can choose appropriate vocabulary when writing English.

・ I know grammatical rules and different parts of speech.
・ I can speak English with the knowledge of correct pronunciation.
・ I can research necessary information and present the results.
・ I can see the difference between written and spoken English.
・ I can make myself understood by everyone.
・ I can understand what is spoken in English.
・ I can understand what native English speakers say.

5.3 Analyses and results

First, to estimate adequate sample size, statistical power analysis using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) was performed, while referring to Mizumoto and Takeuchi (2011) for effect sizes. For the paired *t*-test conducted in this study, the projected sample size with $d = 0.5$, alpha = .05, and power = 0.80 is $N = 34$. Thus, the actual data size ($N = 46$) may be slightly more than adequate.

5.3.1 English learning motivational/attitudinal variables

Before examining each English learning motivational/attitudinal variable, the descriptive statistics for each item were checked. As a result, several items showed a ceiling effect: “When I think about my future, it is important that I am able to use English” (variable: ideal L2 self, April questionnaire); “Learning English is necessary because it is an international language” (variable: ought-to L2 self, April questionnaire); “I get nervous and confused when I speak in my English class” (variable: English classroom anxiety, April questionnaire); and “If I made the effort, I could learn a foreign

language" (variable: linguistic self-confidence, January questionnaire). The aforementioned items were included for each variable because they may represent the characteristics of participants and are indispensable to construct variables.

Table 5-1 shows the mean scores, standard deviations, Cronbach's alphas for surveys conducted in April and January,[2] and the results of paired *t*-tests that examined if there was a significant level of growth in each variable between April and January. Since multiple comparisons were made using paired *t*-tests, Bonferroni's adjustment was applied to maintain the error rate. The statistical significance .05 became .01 because there were five variables. Hence, the *t*-test results were significant when $p < .01$. Figure 5-1 shows how the means of each variable changed between April and January. Although Cronbach's alphas of the ought-to L2 self (January), linguistic self-confidence (April and January), and English classroom anxiety (January) were slightly low, it may be acceptable considering the short scale and characteristic of longitudinal study (Dörnyei, 2007). According to the results of the paired *t*-tests, both probability and Cohen's *d* indicated that English classroom anxiety lessened significantly. For attitudes towards learning English, although probability did not show significant improvement after Bonferroni's adjustment, Cohen's *d* suggested a slight improvement.

Table 5-1

Means, Standard Deviations, and t-test Results of the English Learning Motivational Variables

	April		January				
N = 46	*M* (*SD*)	α	*M* (*SD*)	α	*t*	*p*	Cohen's *d*
IL2S	4.36 (1.25)	.87	4.43 (1.11)	.82	-0.12	.908	.06
OL2S	5.28 (1.29)	.79	5.45 (1.01)	.64	-1.00	.324	.15
ATLE	3.84 (1.14)	.80	4.14 (1.08)	.83	-2.16	.036	.27
LSC	3.73 (1.25)	.67	3.92 (1.11)	.66	-1.24	.221	.16
ECA	5.61 (1.29)	.71	5.03 (1.47)	.67	2.89*	.006	.42

Note. IL2S = ideal L2 self; OL2S = ought-to L2 self; ATLE = attitudes towards learning English; LSC = linguistic self-confidence; ECA = English classroom anxiety.
*$p < .01$.

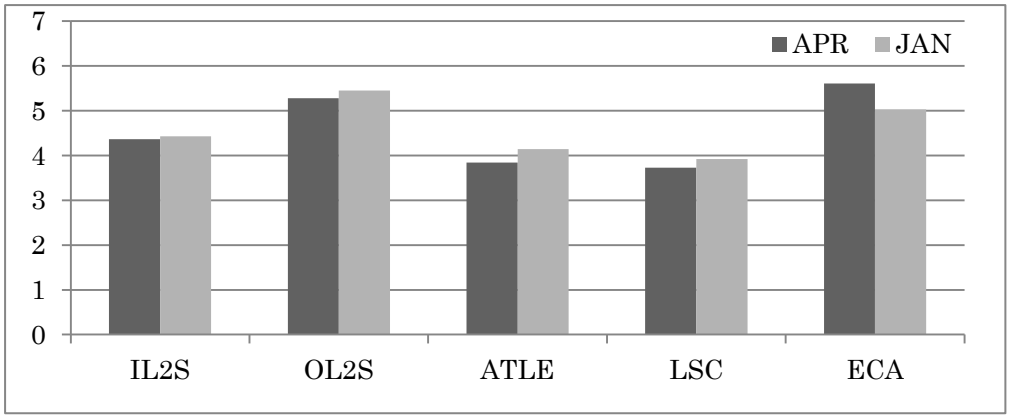

Figure 5-1. Changes in the means of each English learning motivational variable between April and January. IL2S = ideal L2 self; OL2S = ought-to L2 self; ATLE = attitudes towards learning English; LSC = linguistic self-confidence; ECA = English classroom anxiety. *N* = 46.

Table 5-2 represents correlations between each variable in April and January. In April, significant positive correlations were found between the ideal L2 self and attitudes towards learning English, between the ideal L2 self and the ought-to L2 self, between the ideal L2 self and linguistic

self-confidence, as well as between attitudes towards learning English and linguistic self-confidence. In January, there were significant positive correlations between the ideal L2 self and attitudes towards learning English, between the ideal L2 self and linguistic self-confidence, and between attitudes towards learning English and linguistic self-confidence. A significant negative correlation was found between English classroom anxiety and linguistic self-confidence in January, which was not significant in April.

Table 5-2

Correlations Between English Learning Motivational Variables in April and January

	April				
	IL2S	OL2S	ATLE	LSC	ECA
IL2S	-				
OL2S	.33*	-			
ATLE	.59***	.21	-		
LSC	.46**	.28	.65***	-	
ECA	-.11	.02	-.19	-.28	-
	January				
	IL2S	OL2S	ATLE	LSC	ECA
IL2S	-				
OL2S	.16	-			
ATLE	.50**	.25	-		
LSC	.34*	.26	.64***	-	
ECA	-.25	.06	-.14	-.42**	-

Note. IL2S = ideal L2 self; OL2S = ought-to L2 self; ATLE = attitudes towards learning English; LSC = linguistic self-confidence; ECA = English classroom anxiety.
*p < .05, **p < .01, ***p < .001.

5. 3. 2 Perceived competence

For perceived competence, the descriptive statistics were also examined first, and two items (both from the April questionnaire) showed a

floor effect: “I can speak English with the knowledge of correct pronunciation” and “I can understand what native English speakers say.” These items are also included in the analysis because they may be important to construct categories.

The author first attempted an exploratory factor analysis; however, the given factors were difficult to interpret, probably because the number of participants was small. As described above (section 5.2.2-2), can-do list items were selected so that they represent several different skills. According to the selected skills, the author categorized items into several groups. After verifying the Cronbach’s alphas of each group, a set of three categories exhibiting the highest Cronbach’s alphas was selected. These three categories were: (1) English writing skills (4 items, e.g., “I can check my English writing using a dictionary and textbooks”); (2) presentation and explanation skills (6 items, e.g., “I can express what I want to say in English”); (3) daily conversation skills (3 items, e.g., “I can make a simple conversation in English”). One item, “I can understand English documents,” was omitted because it did not belong to any category. A list of items including categorization is introduced in the translated version of Appendix B-2.

Table 5-3 shows the mean scores, standard deviations, and Cronbach’s alphas for these categories and the results of the paired *t*-tests between April and January. For the *t*-tests, Bonferroni’s adjustment was applied again; because three comparisons were made, the significant alpha level was set at .017 ($p < .017$). As Figure 5-2 indicates, each category showed a rather low profile. However, significant differences between April and January for all categories were suggested by both probability and Cohen’s *d*, as in Table 5-3.

In particular, the largest increase was in English writing skills.

Table 5-3

Means and Paired t-test Results Between April and January for Perceived Competence of English-Using Skills

	April		January				
N = 46	*M* (*SD*)	α	*M* (*SD*)	α	*t*	*p*	Cohen's *d*
EWS	1.84 (0.53)	.76	2.17 (0.42)	.67	-5.60*	.000	.68
PES	2.06 (0.55)	.81	2.32 (0.49)	.72	-3.96*	.000	.50
DCS	2.07 (0.63)	.73	2.24 (0.58)	.78	-2.70*	.010	.29

Note. EWS = English writing skills; PES = presentation and explanation skills; DCS = daily conversation skills.
*$p < .017$.

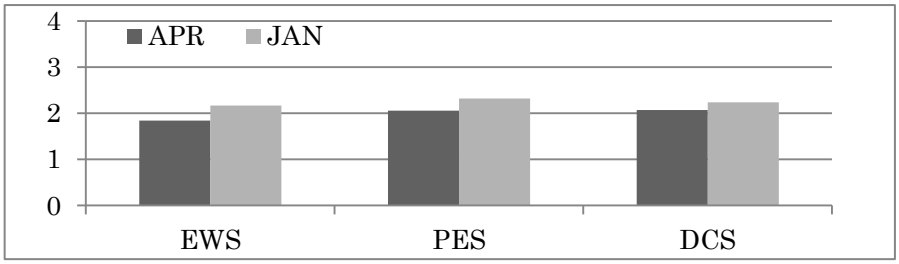

Figure 5-2. Changes in means of perceived competence. EWS = English writing skills; PES = presentation and explanation skills; DCS = daily conversation skills. *N* = 46.

5. 4 Discussion

This study aimed to examine the effects of educational intervention on engineering students' motivation or attitudes towards learning English from the perspective of Dörnyei's L2 motivational self-system. As a form of educational intervention, English presentations that introduce engineering or machinery products of students' interest were used, and two research questions were posed: 1) How did engineering students' motivation and attitudes towards learning English change through a year-long

presentation-based English course? 2) How did engineering students' perceived English competence change through a year-long presentation-based English course? The discussions below attempt to answer these questions.

5.4.1 Research question 1

According to the results presented in Table 5-1, English classroom anxiety lessened significantly, while attitudes towards learning English slightly improved from April to January. Both English classroom anxiety and attitudes towards learning English represent students' perceptions towards a learning situation, and the students showed significantly less anxiety and slightly more favorable attitudes towards learning English after completing a year-long presentation-based class. Although changes in attitudes towards learning English did not appear significant after Bonferroni's adjustment, they may be worth paying attention to because Cohen's *d* suggests a slight change. This may mean that the presentation activities helped the students acclimate themselves to speaking English in the classroom, overcome their anxieties, and gain slightly more interest in learning English. The correlations (see Table 5-2) did not exhibit a direct relationship between English classroom anxiety and the ideal L2 self or the ought-to L2 self. However, in January the ideal L2 self showed a positive significant correlation with linguistic self-confidence, while English classroom anxiety showed a negative significant correlation with linguistic self-confidence. This result may mean that students who overcame their anxiety gained confidence and maintained their ideal image of using English. The reason why both the ideal L2 self and the ought-to L2 self did not exhibit significant growth in this survey is that it

may take the students a little longer to internalize the attitudinal changes in their self-images.

Therefore, for research question 1 (" How did engineering students' attitudes and motivation towards learning English change through a year-long presentation-based English course?") it is possible to say that the presentation-based course helped the students overcome the fear of using English in the classroom and increased their interest in learning English.

5.4.2 Research question 2

All categories showed significant growth between April and January, hinting at the answer to research question 2 ("How did engineering students' perceived English competence change through a year-long presentation-based English course?"). Since the class was presentation-based, it is natural that the students felt that their presentation skills had improved. However, English writing showed higher growth when compared to presentation and explanation skills, which might indicate that the students perceived greater progress in acquisition of English writing, rather than in acquisition of presentation skills through the presentation-based courses. Therefore, it is reasonable to say that the engineering students felt that the presentation-based course was effective in improving writing and presentation skills, both of which are necessary in the field of technical communication. The fact that daily conversation showed significant growth also suggests English presentation activities were effective for the engineering students in acquiring integrated English skills.

Although perceived English competence exhibited significant growth, the ideal L2 self, the ought-to L2 self, and linguistic self-confidence did not

show significant changes from April to January. As described in section 5.2.2, questionnaire items of perceived competence mainly concern necessary English skills for engineering students. While the students perceived growth in their English skills, it is possible that they did not consider their current English proficiency as sufficient and consequently failed to possess strong linguistic self-confidence. It may take longer for them to link their perceived growth in English competence with linguistic self-confidence.

5.5 Conclusion

This study found that engineering students were aware of the necessity of studying English as a foreign language. Since the students were able to overcome their fear of using English in the classroom and gained interest in learning the language following a year-long presentation-based course, it is possible to say that presentation activities are effective in reducing students' anxieties as English speakers, while also stimulating their interest in learning English. Significant growth in the students' perceived competence further proves that presentation activities are effective in increasing engineering students' confidence in their English proficiency, although it may take longer to connect this growth with their self-image as an English user. Thus, this study suggests that providing opportunities to present in English is an effective way of motivating engineering students and leading them to overcoming anxieties about using English in the imagined international discourse community.

Based on these results, Study 3 investigates the processes and mechanism by which presentation-based courses stimulate engineering

students’ motivation development.

Notes

1. Dr. Ryan was collecting data in 2006 when I obtained the scales used in this study from him. I would like to express my thanks to him for granting me permission to use them.

2. Since the Cronbach's alpha of the ought-to L2 self in January was only .36, I removed two items as suggested by the data; afterward, the Cronbach's alpha improved to .64 in January and .79 in April. Although the Cronbach's alpha in January was slightly low, the author judged it acceptable and the remaining three items were used for the ought-to L2 self in this study.

6. Study 3

This chapter introduces Study 3, which examined the motivational effect of presentation-based instruction by applying two theoretical frameworks: the L2 motivational self-system for assessing students' future self-image as English-using engineers and self-determination theory (SDT) for investigating the process and mechanism of motivational changes brought about by the educational intervention.

6.1 Research objectives and questions

Study 2 examined the effect of presentation-based instruction on engineering students' attitudes toward and motivation to learn English on the basis of the theory of the L2 motivational self-system. The results revealed that the surveyed students understood the importance of learning English but had little confidence in their ability to use it. Further, the results showed that the students were able to gain confidence in their use of English and overcame their anxiety regarding it after taking a one-year presentation-based course. On the basis of these results, the author thought it would be useful to identify the process and mechanism of the motivational changes that occur in students over the duration of such a course. SDT incorporates both psychological development and goal-directed behavior (Deci & Ryan, 2000) by considering the relationships between human innate psychological needs and psychological well-being. In other words, this theory allows researchers to investigate the process of motivational changes depending on the degree to which psychological needs are satisfied (Hiromori, 2006a; Noels, 2003; Tanaka & Hiromori, 2007). Following the example of Japanese researchers

who had applied this theory in interventional studies assessing motivational change (e.g., Hiromori, 2006a; Nishida and Yashima, 2009a; Tanaka, 2013), this study employed SDT in its design and implementation to reveal how Japanese engineering students developed English learning motivation. The L2 motivational self-system was also used to investigate how clearly the participants envisioned English-using situations as a part of their future career.

Thus, the objectives of Study 3 were to examine how taking a presentation-based course affected the way engineering students felt about learning English, and to investigate the changing process and mechanism of English learning motivation. The following research questions were posed: 1) What kind of effect does a presentation-based language course have on motivation? 2) How does the degree to which three psychological needs (autonomy, competence, and relatedness) are satisfied relate to English learning motivation? 3) Can we identify groups with different reactions to presentation-based teaching according to their different motivational profiles?

6.2 The class content and self-determination theory

The classroom instruction implemented as part of Study 3 was basically the same as that introduced in Chapter 3 and implemented in Study 2 (Chapter 5). In SDT, it is regarded as important to satisfy the three basic psychological needs of learners—*autonomy, competence*, and *relatedness*—in order to increase the learners' motivation to a more self-determined level (Deci & Ryan, 1985, 2000). In the present case, to satisfy these psychological needs and to raise the students' motivation to a highly self-determined level,

it was carefully ensured that the following would occur.

1) Within the stated theme of the class, “introduction of a mechanical product,” the students were permitted to choose what product they would introduce. It was expected that allowing them to choose and research a topic of their own interest would satisfy their need for autonomy.
2) The students gave four presentations in the class (in a single academic year), with requirements of speech content that gradually became more and more complicated and contained more in-depth information; it was expected that repeatedly practicing presentation performance would help them improve their English skills and feel more competent and accomplished. As a result, their need for competence may be satisfied.
3) The students were permitted to present individually, in pairs, or in groups of three. Giving them these choices regarding presentation group, topic, and style may have satisfied their need for autonomy. Furthermore, working in groups or in pairs helped them develop good relationships with their classmates, as did their peer evaluations and the comments and questions provided in Q&A sessions after each presentation. The students may have felt a sense of relatedness as a result of these peer-to-peer communications.

6.3 Study

6.3.1 Participants and procedure

The participants were two cohorts of second- and third-year students in the mechanical engineering department enrolled in a one-year course of Technical English I (TEI) and Technical English II (TEII) taught by the author. TEI was for second-year students, while TEII was for third-year students.

Questionnaire surveys were distributed in classes at the beginning (April), the middle (July), and the end (January) of 2009 and 2010 academic years. In 2009, 46 students enrolled (33 in TEI and nine in TEII); in 2010, 51 students enrolled (45 in TEI and six in TEII). A written explanation of the purpose of the study and the intended use of the data was provided to the students along with the questionnaire; the author also carefully explained the purpose of the research to the students verbally and informed them that they had the right to refuse to participate, or, if they did choose to participate, to ask subsequently for their data to be removed. Data for 37 students who did not undertake all of the surveys were excluded from the analysis, leaving a final total of 60 participants (22 in TEI and nine in TEII in 2009, and 26 in TEI and three in TEII in 2010).

6.3.2 Questionnaire

The questionnaire (Appendix C) consisted of four parts: English learning motivational/attitudinal questionnaire, perceived competence, three psychological needs related to learning English, and English learning motivational regulations.

1. English learning motivational/attitudinal questionnaire (20 items, 7-point scale; Ryan, 2008; Appendix C-1)

An adaptation of the Motivational Factors Questionnaire (MFQ) developed by Ryan (2008, 2009) was used, as in Study 1 (Chapter 4) and Study 2 (Chapter 5). However, items covering *English use anxiety* were added to the questionnaire considering the results of Study 2, in which the students showed significantly less English classroom anxiety after taking a one-year

presentation-based class. That is, the author decided to examine whether such an educational intervention would also help students overcome anxiety about using English in general. One item for the ought-to L2 self was also added so that this variable would include all of the original items developed by Ryan (2008). As this study used a four-part questionnaire, the author tried to limit the number of items to the same as or fewer than those in the previous studies, so as not to impose too much strain on the participants. The ideal L2 self and the ought-to L2 self were indispensable in the present context, as they are core components of the L2 motivational self-system. Linguistic self-confidence was also important as it represents L2 learning experience, a component of the L2 motivational self-system. As a result, four items on attitudes towards learning English were eliminated this time. Thus, variables were set as follows: *ideal L2 self* (six items), *ought-to L2 self* (six items), *linguistic self-confidence* (three items), *English classroom anxiety* (two items), and *English use anxiety* (three items). Additional items are as follows.

Ought-to L2 self. The one new item here was "If I don't try to learn English I'll be letting someone else down."

English use anxiety. Three items served to assess the level of anxiety when using English with native English speakers. The items were: "I am worried that other speakers of English would find my English strange," "I would feel uneasy speaking English with a native speaker," and "If I met an English speaker, I would feel nervous."

2. Perceived competence (14 items, four-point scale; Appendix C-2)

The same items as in Study 2 (Chapter 5) were used.

3. Three psychological needs related to learning English under SDT (18 items, five-point scale; Hiromori, 2006b; Appendix C-3)

On the basis of previous studies applying self-determination theory to the fields of work organization and social development (Deci & Ryan, 2002; Ryan & Deci, 2000), Hiromori (2006b) developed 18 items within three variables that concern the degree to which psychological needs are fulfilled in English education. This questionnaire used a 5-point scale as Hiromori (2006b) originally did. The three categories and the items assessing them are as follows.

Autonomy. Six items were used to assess the degree to which learners thought they had choices and freedom in an English class (e.g., "My teacher asks for the opinions of students about the content and/or procedure of the class").
Competence: Six items were used to reflect the degree of competence learners believed they could achieve in English (e.g., "I think I will get good grades in the English class").
Relatedness. Six items served to assess how good students perceived their relationships with their classmates to be (e.g., "I get along with my classmates in the English class").

In the first questionnaire (administered in April), questions were asking to what extent each psychological need was fulfilled by English classes in general. In the second and third questionnaires (administered in July and January respectively), the questions were changed to ask to what degree the technical English class in which the student was currently enrolled (TEI or TEII) satisfied these needs.

4. English learning motivational regulation (24 items, five-point scale; Hiromori, 2006b; Appendix C-4)

The same variables and questions as in Study 1 (Chapter 3) were used. However, one item for intrinsic motivation, "Studying English interests me," was missing by mistake.

6.4 Analyses and results

Statistical power analysis using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) was performed, while referring to Mizumoto and Takeuchi (2011) for effect sizes. For one-way repeated measures ANOVA and mixed-model repeated-measures ANOVAs in this study, the projected sample sizes with an f = .025, f^2 = 0.15, alpha = 0.5, and power = 0.80 were N = 28 and N = 36 respectively. The actual data size (N = 60) was more than adequate. However, the projected sample size for multiple regression analysis with f^2 = 0.15, alpha = 0.05, and the number of predictors = 3, and power = 0.80 was N = 77, which is more than the actual data size.

6.4.1 English learning motivational/attitudinal variables

First, the descriptive statistics for each item in each survey were checked; several items showed ceiling effects, for example: "For me to become an educated person, I should learn English" (April, July, and January surveys), "Learning English is necessary because it is an international language" (April and January surveys), "When I think about my future, it is important that I use English" (April and January surveys), and "If I met an

English speaker, I would feel nervous" (April survey). The author has nevertheless included these items in the factor analysis and the report of the results, as the results may identify characteristics of participants and still potentially be useful.

Although the author tried to conduct the analysis using the original variables developed by Ryan, some variables exhibited Cronbach's alphas that were too low: the ought-to L2 self (α = .58 in April; α = .45 in July; and α = .59 in January), linguistic self-confidence (α = .69 in April; α = .68 in July; and α = .44 in January), and English classroom anxiety (α = .78 in April; α = .52 in July; and α = .001 in January). Deleting the items suggested by the data did not improve overall Cronbach's alphas, and so the author decided to conduct an exploratory factor analysis. First, a principal factor analysis was conducted using the data from the first questionnaire (administered in April); three factors were yielded. After deleting items with less than 0.4 factor loadings for all factors, a maximum likelihood factor analysis with promax rotation was conducted. The author then decided to use the three factors provided as defaults: the ought-to L2 self (Factor 1; α = .88 in April; α = .80 in July; α = .83 in January), anxiety (Factor 2; α = .82 in April; α = .79 in July; α = .75 in January), and the ideal L2 self (Factor 3; α = .85 in April; α = .84 in July; α = .85 in January). Cronbach's alphas for all factors in all months were found to be high enough; thus, these factors were applied for further analysis. Table 6-1 shows the results of the factor analysis.

Table 6-1

Results of the Factor Analysis for Motivational Variables (Promax Rotation, Maximum Likelihood Method, N = 60)

		Factor 1	Factor 2	Factor 3	Communality
Factor 1: Ought-to L2 self					
12	When I think about my future, it is important that I can use English.	**.95**	.01	-.09	.84
9	Learning English is necessary because it is an international language.	**.89**	.09	-.15	.75
6	If I made the effort, I could learn a foreign language	**.69**	-.14	.12	.68
7	The things I want to do in the future require me to speak English.	**.59**	.15	.26	.67
3	For me to become an educated person I should learn English.	**.58**	.15	.06	.49
11	I would like to be able to use English to communicate with people from other countries.	**.52**	-.24	.28	.62
Factor 2: Anxiety					
14	I am worried that other speakers of English would find my English strange.	-.15	**.85**	.26	.54
19	If I met an English speaker, I would feel nervous.	.00	**.74**	.07	.71
2	I get nervous and confused when I am speaking in my English class.	.10	**.67**	.00	.69
20	I would feel uneasy speaking English with a native speaker.	.15	**.59**	-.17	.70
8	I always feel that my classmates speak English better than I do.	.10	**.55**	-.16	.67
Factor 3: Ideal L2 self					
16	I can imagine speaking English with international friends.	-.13	.00	**.93**	.70
5	I often imagine myself as someone who is able to speak English.	.09	.05	**.82**	.69
1	Whenever I think of my future career, I imagine myself being able to use English.	.14	.16	**.68**	.63
10	I am sure I will be able to learn a foreign language.	.13	-.36	**.52**	.68

Correlation factor matrix	Factor 1	Factor 2	Factor 3
1.Ought-to L2 self	-		
2.Anxiety	.12	-	
3.Ideal L2 self	.50	-.34	-

Note. Factor loadings > .40 are in boldface.

Table 6-2 presents the mean scores and standard deviations of subscales of motivational variables given by the factor analysis, as well as Cronbach's alphas for those subscales. The table also shows the results of a repeated-measures analysis of variance (ANOVA) with time (1: April; 2: July; 3: January) as a within-group factor using the mean scores. The results showed that the ought-to L2 self and anxiety were high in April, whereas the ideal L2 self was relatively low at that time. As Figure 6-1 shows, however, there was a slight increase in the ideal L2 self from April to January; nevertheless, none of the factors showed a statistically significant change.

Table 6-2

Mean Scores, Standard Deviations, and Cronbach's Alphas for Each Subscale and Results of a Repeated-Measures ANOVA With Time for Motivational Variables (N = 60)

	April		July		January				
	M (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*F*	*p*	Partial η^2
OL2S	5.50 (1.18)	.88	5.43 (0.97)	.80	5.47 (1.10)	.83	0.15	.860	.00
AXT	5.21 (1.22)	.82	5.26 (1.09)	.79	5.15 (1.05)	.75	0.41	.664	.01
IL2S	3.25 (1.40)	.85	3.40 (1.42)	.84	3.45 (1.43)	.85	1.11	.334	.02

Note. OL2S = ought-to L2 self; AXT = anxiety; IL2S = ideal L2 self.

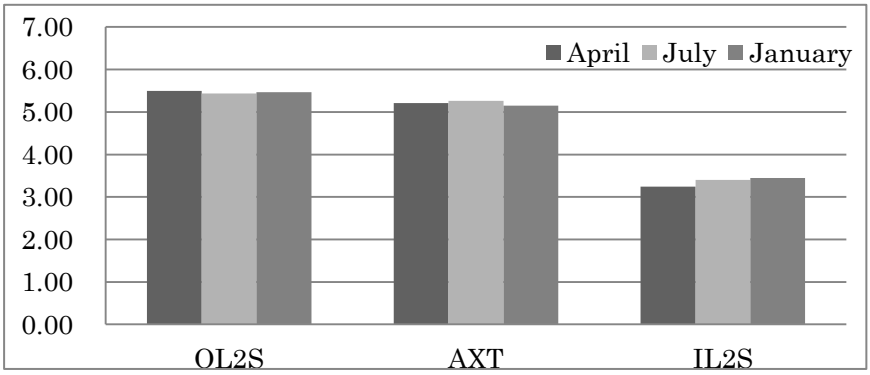

Figure 6-1. Changes in means of motivational variables in accordance with time. OL2S = ought-to L2 self; AXT = anxiety; IL2S = ideal L2 self. *N* = 60.

6.4.2 Perceived competence

With regard to perceived competence, exploratory factor analysis was also conducted. A principal factor analysis was conducted, and three factors were extracted. After deleting two items with less than 0.4 factor loadings for all factors, the author conducted a maximum likelihood factor analysis with promax rotation, and adopted three factors suggested by the data: *presentation* (Factor 1), *knowledge* (Factor 2), and *comprehension* (Factor3). Table 6-3 shows the results of the factor analysis.

Table 6-4 shows the mean scores and standard deviations of items for the three subscales suggested by the factor analysis, as well as Cronbach's alphas for those subscales.[1,2] The results of a repeated-measures ANOVA with time (1: April; 2: July; 3: January) as a within-group factor is also presented in the table. The results showed that mean scores of all factors increased from April to January as shown in Figure 6-2. The increases were statistically significant for presentation and knowledge. The further analysis with Tukey's test showed that both presentation and knowledge significantly increased from April to July.

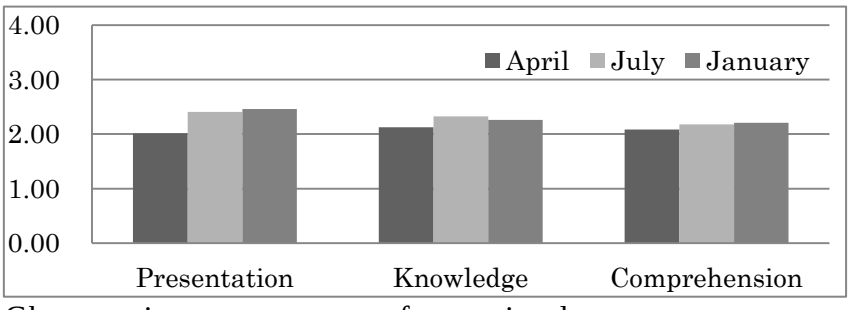

Figure 6-2. Changes in mean scores of perceived competence overtime. *N* = 60.

Table 6-3

Results of the Factor Analysis for Perceived Competence (Promax Rotation, Maximum Likelihood Method, N = 60)

		Factor 1	Factor 2	Factor 3	Communality
Factor 1: Presentation					
4	I can give a presentation in English.	**.99**	.00	.00	.54
10	I can research necessary information and present the result.	**.57**	.43	.19	.55
9	I can speak English in a way that reflects knowledge of correct pronunciation.	**.53**	.30	.02	.41
6	I can write English materials for a presentation.	**.52**	.49	-.10	.58
Factor 2: Knowledge					
7	I can choose appropriate vocabulary when writing English.	.36	**.79**	-.30	.66
8	I know the grammatical rules and different parts of speech of English.	.35	**.52**	-.12	.48
11	I can see the difference between written and spoken English.	.11	**.51**	.17	.36
12	I can make myself understood by everyone in English.	.43	**.48**	-.03	.51
3	I can check my English writing using dictionaries and textbooks.	.44	**.46**	.00	.52
Factor 3: Comprehension					
13	I can understand what is said in English.	.16	.32	**.73**	.48
2	I can understand English documents.	.25	.36	**.52**	.47
14	I can catch what native English speakers say.	.14	.44	**.46**	.40

Correlation factor matrix	Factor 1	Factor 2	Factor 3
1. Presentation	-		
2. Knowledge	.47	-	
3. Comprehension	.57	.38	-

Table 6-4

Mean Scores, Standard Deviations, and Cronbach's Alphas of Each Subscale and Results of a Repeated-Measures ANOVA with Time for Perceived Competence (N = 60)

	April		July		January				
	M (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*F*	Partial η^2	
PR	2.01 (0.54)	.79	2.41 (0.48)	.72	2.46 (0.49)	.69	29.66 $p < .001$	.34	A-JU $p < .001$ A-JA $p < .001$
KN	2.13 (0.52)	.79	2.32 (0.37)	.52	2.26 (0.45)	.72	7.36 $p = .001$	.11	A-JU $p = .001$
CH	2.08 (0.51)	.74	2.18 (0.47)	.50	2.21 (0.50)	.66	2.04 $p = .135$	.03	

Note. PR = presentation; KN = knowledge; CH = comprehension. A = April; JU = July; JA = January.

6.4.3 Three psychological needs related to learning English

The three variables of autonomy, competence, and relatedness represent the degree to which each psychological need was fulfilled. Table 6-5 shows the mean scores, standard deviations, and Cronbach's alphas for each variable[3] as well as the results of a repeated-measures ANOVA with time (1: April; 2: July; 3: January) as a within-group factor. The results of the ANOVA show a statistically significant increase in all needs with time. As shown by further research with Tukey's test and in Figure 6-3, satisfaction with all needs increased steeply from April to July, and that satisfaction with the needs of relatedness continued to increase from July to January.

Table 6-5

*The Means, Standard Deviations, and Cronbach's Alphas of Sense of Satisfaction with Each Psychological Need and the Results of a Repeated-Measures ANOVA With Time for Three Psychological Needs (*N = *60)*

	April		July		January				
	M (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	F	Partial η^2	
NA	2.37 (0.70)	.74	3.30 (0.45)	.54	3.21 (0.47)	.53	81.38 $p < .001$	.59	A-JU $p < .001$ A-JA $p < .001$
NC	2.48 (0.60)	.62	3.13 (0.52)	.67	3.18 (0.59)	.70	46.17 $p < .001$	.44	A-JU $p < .001$ A-JA $p < .001$
NR	2.86 (0.68)	.75	3.44 (0.51)	.64	3.64 (0.64)	.76	35.30 $p < .001$	.38	A-JU $p < .001$ A-JA $p < .001$ JU-JA $p = .031$

Note. NA = autonomy; NC = competence; NR = relatedness. A = April; JU = July; JA = January.

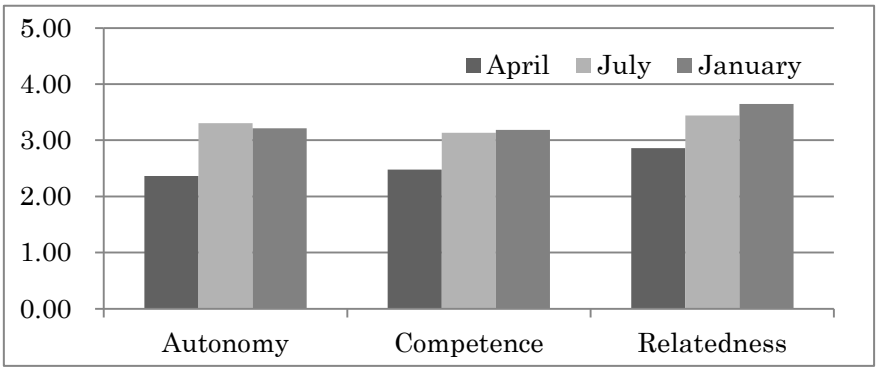

Figure 6-3. Mean changes in sense of satisfaction with three psychological needs over time. *N* = 60.

6.4.4 English learning motivational regulations

The five variables reflecting English learning motivational regulation represent the degree to which learning was self-determined. Table 6-6 presents the means and standard deviations for the variables related to English learning motivational regulation, Cronbach's alphas,[4,5] and the result of a repeated-measures ANOVA with time (1: April; 2: July; 3: January) as a

within-group factor. The ANOVA showed that amotivation decreased significantly from July to January, and that there was no significant change in the remaining forms of motivational regulation. As can be seen in Figure 6-4, the mean of identified regulation was always the highest value, followed by introjected regulation and external regulation. Intrinsic motivation and amotivation showed comparatively low mean values.

Table 6-6

Mean Scores, Standard Deviations, and Cronbach's Alphas for Each Motivational Regulation and Results of a Repeated-Measures ANOVA With Time for All Types of Motivational Regulation (N = 60)

	April		July		January				
	M (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*F*	Partial η^2	
IM	2.95 (0.89)	.82	3.08 (0.77)	.80	3.01 (0.88)	.86	1.92 p = .365	.02	
ID	3.99 (0.80)	.88	3.83 (0.72)	.84	3.98 (0.72)	.82	2.39 p = .097	.04	
IN	3.60 (0.78)	.53	3.54 (0.80)	.64	3.61 (0.70)	.52	0.36 p = .698	.01	
EX	3.07 (0.82)	.64	3.08 (0.80)	.55	3.10 (0.82)	.58	0.06 p = .945	.00	
AM	2.53 (0.77)	.74	2.53 (0.76)	.75	2.28 (0.73)	.76	4.57 p = .012	.07	A-JA p = .017 JU-JA p = .048

Note. IM = intrinsic motivation; ID = identified regulation; IN = introjected regulation; EX = external regulation; AM = amotivation. A = April; JU = July; JA = January.

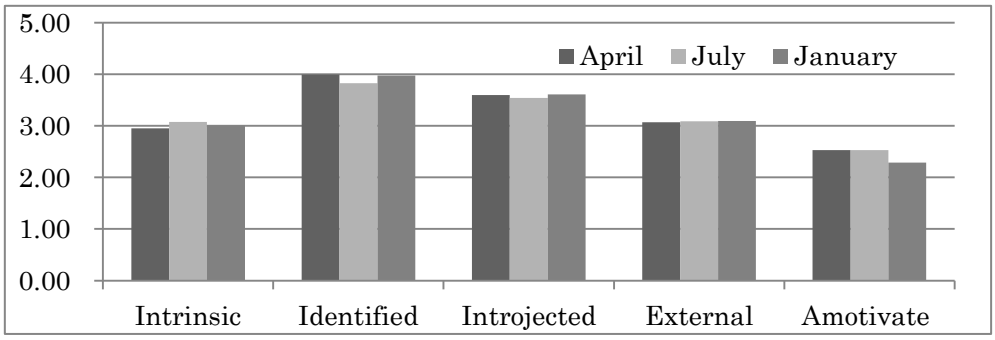

Figure 6-4. Changes in mean scores of motivational regulations. *N* = 60.

6.4.5 Influence of satisfied psychological needs

Self-determination theory holds that individuals are more self-determined to engage in an activity within a context in which their three psychological needs of autonomy, competence, and relatedness are satisfied (Deci & Ryan, 2000). Therefore, in the present study, a multiple regression analysis was conducted to measure how the level of satisfaction of the three psychological needs influences English learning motivational regulations as well as two English learning motivational variables, ideal L2 self and ought-to L2 self, in each survey. Each type of English learning motivational regulation, ideal L2 self, and ought-to L2 self were set as dependent variables in each survey; the independent variables included the three psychological needs for the same survey date (Table 6-7).

In April, satisfaction with one's competence was a positive predictor for intrinsic motivation, the ideal L2 self, and the ought-to L2 self; it also negatively influenced external regulation and amotivation. In July, satisfaction with competence was a strong predictor for intrinsic motivation, identified regulation, introjected regulation, the ideal L2 self, and the ought-to L2 self, and a negative predictor for amotivation. In January, satisfaction with competence was the strongest predictor for intrinsic motivation, identified regulation, the ideal L2 self, and the ought-to L2 self. In April, satisfaction with competence more strongly influenced intrinsic motivation than identified regulation, while in July and January, the influence of satisfaction with competence had gradually shifted and become stronger on identified regulation than on intrinsic motivation. The ideal L2 self was also

influenced by satisfaction with competence more strongly than the ought-to L2 self in April, while the influence of satisfaction with competence on the ought-to L2 self was as strong as that on the ideal L2 self in July and became stronger than that on the ideal L2 self in January.

Table 6-7

Results of Multiple Regression Analysis for Each Survey (Forced Entry)

				APR			
	IM β	ID β	IN β	EX β	AM β	IL2S β	OL2S β
NA	.01	-.21	-.21	-.04	.02	-.12	-.19
NC	.49***	.25	.19	-.35*	-.41**	.52***	.37*
NR	.14	-.01	.15	-.03	-.16	.05	-.00
R^2	.32	.06	.05	.15	.25	.25	.10
F	8.85	1.11	0.99	3.28	6.03	5.93	2.07
				JUL			
	IM β	ID β	IN β	EX β	AM β	IL2S β	OL2S β
NA	.01	.05	-.05	.01	.03	-.12	.03
NC	.41**	.46**	.29*	-.09	-.33 *	.57***	.58***
NR	.07	.05	.13	-.03	-.10	-.03	-.01
R^2	.20	.25	.11	.01	.14	.28	.35
F	4.53	6.25	2.35	0.11	2.91	6.97	9.89
				JAN			
	IM β	ID β	IN β	EX β	AM β	IL2S β	OL2S β
NA	.12	.02	-.06	.13	-.16	-.03	-.01
NC	.38*	.52**	.19	-.18	-.09	.38*	.46**
NR	.16	-.03	.05	-.09	-.12	-.12	-.15
R^2	.28	.26	.05	.06	.07	.10	.15
F	7.24	6.51	0.93	1.19	1.40	1.99	3.29

Note. *N* = 60. Independent Variables: three psychological needs. NA = autonomy; NC = competence; NR = relatedness. Dependent Variables: English Learning Motivational Regulations, Ideal L2 Self, and Ought-to L2 Self. IM = intrinsic motivation; ID = identified regulation; IN = introjected regulation; EX = external regulation; AM = amotivation; IL2S = ideal L2 self; OL2S = ought-to L2 self.
* $p < .05$, ** $p < .01$, *** $p < .001$.

6.4.6 Identifying learner subgroups based on motivational profile

A hierarchical cluster analysis using Ward's method with Euclidean distance was performed on the five types of motivational regulation in the first questionnaire (administered in April) to identify the subgroups of learners, based on their motivational tendencies. On the basis of the results of

this cluster analysis, the number of clusters was set at three. An ANOVA confirmed a significant main effect of cluster for each of the five indicators (Table 6-8).

Table 6-8

Results of Cluster Analysis Using Five Types of Motivational Regulation in the First (April) Questionnaire (Euclidian Distance, Ward's Method)[6]

	Cluster 1	Cluster 2	Cluster 3			
n	22	13	24	*df*	*F*	*p*
Intrinsic	3.82 (0.44)	1.92 (0.33)	2.72 (0.62)	2,56	61.57	< .001
Identified	4.48 (0.45)	2.83 (0.48)	4.17 (0.55)	2,56	47.30	< .001
Introjected	3.95 (0.73)	2.77 (0.71)	3.72 (0.47)	2,56	14.72	< .001
External	2.58 (0.74)	3.03 (0.67)	3.54 (0.71)	2,56	10.63	< .001
Amotivation	2.07 (0.61)	3.08 (0.79)	2.65 (0.68)	2,56	9.56	< .001

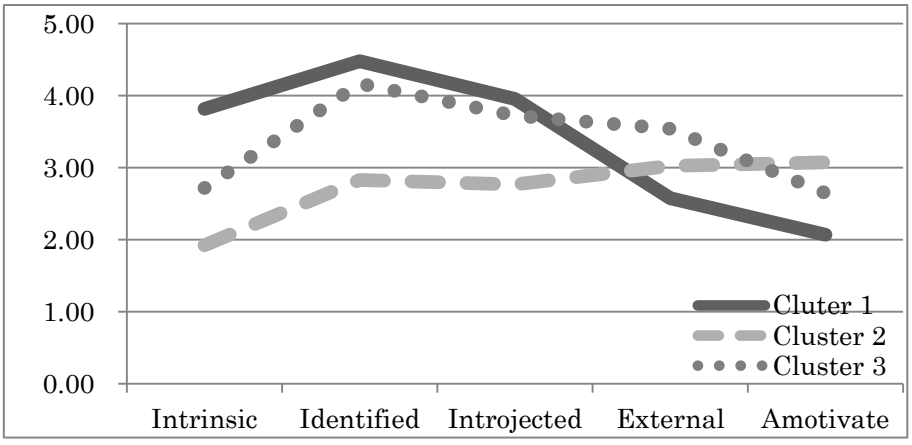

Figure 6-5. The motivational profile of each cluster.

As shown in Figure 6-5, Cluster 1 shows the highest level of intrinsic motivation, identified regulation, and introjected regulation. Cluster 2 is the highest for amotivation and shows the lowest intrinsic, identified, and

introjected regulation. Cluster 3 does not score as high as Cluster 1 with regard to intrinsic motivation, but has comparable scores for identified and introjected regulation.

To investigate different motivational changes each group shows, mixed-model repeated-measures ANOVAs (3 × 3) were applied. The results showed that the main effect of time-by-cluster was significant only for intrinsic motivation, $F(2,112) = 3.82$, $p = .0060$. Further research with Tukey's test showed that Cluster 2 significantly increased from the first questionnaire (April) to the second questionnaire (July) (Table 6-9). Bonferroni's adjustment was applied to maintain the error rate. The statistical significance .05 became .016 because there were three measurements of ANOVA. According to Figure 6-6, intrinsic motivation for Cluster 2 was lower than that for Cluster 3 in April; however, it grew to be almost as high as that for Cluster 3 in July and showed a similar change in January.

Table 6-9

A Summary of Cluster Characteristics: Mean Scores and Standard Deviations of Intrinsic Motivation With Results of a Repeated-Measures ANOVA With Time

	Cluster 1		Cluster 2		Cluster 3	
n	22		13		24	
df	2,42		2,24		2,33	
April	3.82	(0.44)	1.92	(0.33)	2.72	(0.62)
July	3.63	(0.64)	2.56	(0.65)	2.85	(0.64)
January	3.66	(0.69)	2.38	(0.71)	2.75	(0.74)
F	1.10	*p* = .341	7.91	*p* = .002	0.56	*p* = .553
Partial η^2	.05		.40		.03	
			APR-JUL	*p* = .004		

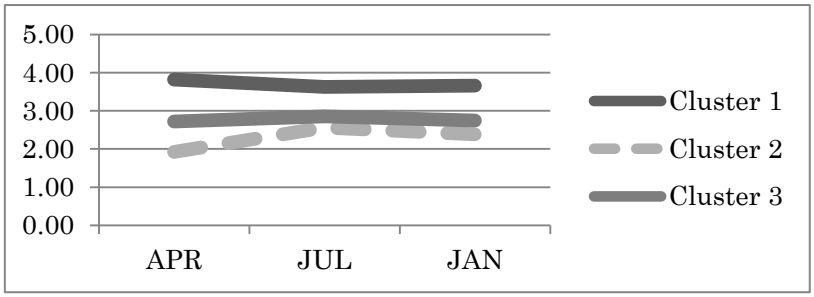

Figure 6-6. Changes in intrinsic motivation for each cluster over time.

6.5 Discussion

6.5.1 Motivational tendencies

Overall, the mean scores for the ought-to L2 self and anxiety were relatively high, whereas that for the ideal L2 self was low (see section 6.4.1). The questions assessing the ought-to L2 self were rather protective, primarily relating to the feeling of pressure or necessity to learn English, while those for the ideal L2 self were more concerned with envisioning a positive self-image as an English-user in the future career. Thus, these results indicate that the students seem to feel the need to learn English for their careers, and have developed a sense that they "ought to learn English," but it is not part of their positive future self-image.

The English learning motivational regulation results (see section 6.4.4) showed that identified regulation was associated with the highest mean score, followed by introjected regulation, while the mean score for intrinsic motivation was lower. Thus, as shown in Figure 6-4, this group of engineering students was not very intrinsically motivated, but that their reasons for learning English were highly self-determined.

The other data will provide answers to the research questions posed

previously; I will discuss them below.

6.5.2 Research question 1

The results showed a statistically significant increase in perceived competence for both presentation and knowledge among the students (see section 6.4.2). This means that the study participants gained confidence in their knowledge of the English language as well as in English presentation skills through the presentation-based course.

There was also a significant increase in satisfaction with how all three psychological needs (autonomy, competence, and relatedness) were met from April to July. As explained in section 6.4.3, the questionnaire given in April asked questions regarding general English courses that the participants had taken previously, while the questionnaires administered in July and January asked questions that were specifically related to the technical English course being taught by the author that the participants were enrolled in at that time. Therefore, the significant difference observed between the April and July data indicates that the presentation-based course was more adequate than other English courses in satisfying each of the three psychological needs.

Although a significant increase in satisfaction in terms of all three psychological needs was observed, significant changes in motivational regulations were not observed, except in the case of a significant decrease in amotivation from July to January, as described in section 6.4.4. Amotivation measures the degree to which students perceive learning the English language to be pointless. Therefore, the answer to research question 1 (" What kind of motivational and emotional effect does a presentation-based course

possess?”) is that the participants in this study began to recognize learning English as meaningful as a result of the presentation-based course. It seems plausible that it would take longer before satisfaction in terms of the three psychological needs begins to take effect on highly self-determined motivational regulations such as intrinsic motivation and identified regulation.

6.5.3 Research question 2

The results presented in section 6.4.5 reveal that satisfaction with their own English competence influenced engineering students’ motivation to learn English. In April, satisfaction with competence was seen to be a strong predictor for intrinsic motivation and the ideal L2 self, which may mean that students who felt a sense of their own competence as a result of their previous English classes felt that learning English was a fun activity and were able to envision a clear self-image as an English-user. In April, satisfaction with competence was also a predictor for amotivation and external regulation, which means that students who feel competent naturally do not consider learning English to be meaningless. From April to July and January, the influence of satisfaction with competence shifted and gradually became stronger on identified regulation than on intrinsic motivation, while the influence of satisfaction with competence also became stronger on the ought-to L2 self than on the ideal L2 self. As described above in section 6.5.1, the April questionnaire asked about previous English classes in general, while the July and January questionnaires related to the technical English class being taught. Therefore, this result suggests the answer to research question 2

("How does the satisfaction of three psychological needs (autonomy, competence, and relatedness) relate to English learning motivation?"). Students who felt a sense of achievement as a result of the course came to hold extrinsic but highly self-determined motivation and to consider it important to learn English for the achievement of their goals and the attainment of future success. In other words, a presentation-based English course may promote a highly self-determined English learning motivation among engineering students; as a result, they consider the implications for their future career and internalize the importance of learning English, rather than regarding it as an activity done for fun or interest.

6.5.4 Research question 3

The clusters described in section 6.4.6 allow the identification of differences in motivational level. Cluster 1 showed the highest intrinsic motivation, making it the most intrinsically motivated group, as well as relatively high identified and introjected regulation. Cluster 2 had the lowest scores for most indicators but higher scores for external regulation and amotivation, and so this group was the least self-determined. Cluster 3 did not have high intrinsic motivation, but scored better in identified and introjected regulation, showing that this group of people was not intrinsically motivated but was highly self-determined.

The result of the mixed-model repeated-measures ANOVA showed a significant effect of time-by-cluster on intrinsic motivation. A closer analysis showed, more specifically, a significant increase in the intrinsic motivation of the least self-determined group (Cluster 2). Figure 6-6 showed that intrinsic

motivation in this group approached that of the highly self-determined group (Cluster 3) in July and showed a similar change to that in Cluster 3 in January. From this result, the answer for the research question 3 (“Can we identify groups with different reactions to presentation-based teaching according to their different motivational tendencies?”) may be that the presentation-based class enabled the least motivated students to become more intrinsically motivated to learn English and helped them become as interested in English as the highly self-determined group.

6.6 Conclusion

This study revealed that the participating engineering students gained confidence in their English skills after engaging in English presentation activities and came to recognize that the learning of English is a meaningful activity. From a psychological needs perspective, the presentation-based course evaluated here was more satisfying for the students than their previous English courses, in which transcoding and reading had been the main activities. As the learners felt their competence in English was increasing, their motivation to learn it became more self-determined. In other words, they became eager to engage in English presentation activities in order to achieve their professional goals. Hayashi (2009) noted that the effect of intrinsic motivation in promoting Japanese students’ commitment to English studies will last when supported by a highly self-determined kind of extrinsic motivation, namely, identified regulation. Although the present result did not show significant changes in motivational regulations except for amotivation, the significant increase in satisfaction with three psychological needs

(autonomy, competence, and relatedness) and influence of satisfaction with competence on identified regulation suggests that English presentation activities may promote participants' commitment to learning the language. It is possible that the influence on the other motivational regulations will be observed over a longer period. Moreover, the course increased intrinsic motivation in the least-motivated students, suggesting that a presentation-based course may most effectively engage those students who have the least motivation initially.

Along with the results of Study 2, this investigation showed the effectiveness of a presentation-based course as a method to train students to speak English in the classroom. In the next chapter, the author will investigate changes in the participating engineering students' English learning and motivation more closely by a mixed method of a qualitative and quantitative analysis of the students' reflections written in learning self-record sheets.

Notes

1. Although the Cronbach's alpha for knowledge in July was low, I continued to use the same construct because deleting items suggested by the data did not improve it.
2. The Cronbach's alpha for comprehension in July was also low. When I deleted the item suggested by the data, the Cronbach's alphas for comprehension in April also became low. Therefore, to maintain the high Cronbach's alphas in April and January, I decided to use the factor suggested by factor analysis.
3. As the Cronbach's alphas for the construct of autonomy in July and January were low, I removed one item that led to improved Cronbach's alphas in both July and January. Although the Cronbach's alphas were still low in July and January, neither one improved sufficiently by the deletion of one or more items. As this variable may include items representing various elements of autonomy, I used the remaining five items to measure autonomy.
4. In order to increase reliability for introjected regulation (as measured by Cronbach's alpha), I removed two items suggested by the data. Although Cronbach's alphas in April and January were still low, further deletion did not improve them. As this regulation was indispensable, I used the remaining three items for introjected regulation.
5. The Cronbach's alpha for external regulation was also low. I removed two items suggested by the data and retained the remaining three to measure external regulation despite low Cronbach's alphas, as further deletion did not improve them any further.

6. Table 6-8 presents the mean scores and standard deviations for motivational regulations in each cluster as well as the ANOVA results.

7. Study 4

This chapter discusses Study 4, which analyzed the students' self-reflection of English presentation activities (named the "learning self-record sheet" in this dissertation). The analyses were mostly conducted qualitatively except for one section that was designed for a quantitative analysis. The author examined aspects to which the engineering students paid attention during speech preparation and performance, how they self-evaluated their speech preparation efforts, and what kind of growth they perceived in themselves. The analysis was expected to reveal the process by which students internalized the image of using English and how they believed acquiring the language through experiencing English presentation activities was necessary for future engineers.

7.1 Research objectives and questions

Studies 2 and 3 quantitatively examined the effects of an English presentation-based course on engineering students. The results revealed that subjects' negative attitudes and emotions such as anxiety and amotivation were reduced, and that they gained confidence in their English skills after taking the course. The results showed that the three psychological needs of autonomy, competence, and relatedness were satisfied through this course, compared to English classes the students had taken previously; it was therefore suggested, based on SDT, that an English presentation-based course would motivate engineering students to learn English. In light of these previous results, this chapter more closely examines the process of how the students internalized the self-concept of an English user and how they started

to regard the language as a necessary skill for future engineers by qualitatively analyzing the students' reflections that were written on learning self-record sheets (Appendix D), which were submitted after each presentation. The quantitative data, which was given on the learning self-record sheet, is also included in this analysis. The specific research questions were: (1) What kind of statement would engineering students make about their presentation and preparation, and how would the statements change as students experience presentations? (2) How would engineering students' efforts in relation to preparation change as they experience presentations? (3) How would engineering students perceive their own growth and achievement through experiencing English presentation activities?

After qualitatively analyzing the given data based on each research question, the author interpreted and summarized the results using the same theoretical frameworks used in Study 3 to interpret the results: the L2 motivational self-system and self-determination theory. When presenting the qualitatively analyzed data, the author occasionally chose to count the number of emerging codes and categories when it seemed that a clearer picture of changes and developments can be drawn by quantifying the occurrence frequency.[1]

7.2 Methods

7.2.1 Participants and general procedure

The participants (N = 27) were sampled from the 45 students who completed TEI in 2010, as described in Study 3 (Chapter 6). As mentioned in section 3.2, the students were required to submit (1) a presentation script, (2)

a peer-evaluation sheet, and (3) a learning self-record sheet after the May, July, November, and December presentations. This study used the learning self-record sheet and analyzed the students' statements qualitatively, although the author occasionally chose to use the quantitative data given on the learning self-record sheet. The following section describes the learning self-record sheet in detail.

7. 2. 2 Materials

The learning self-record sheet consisted of eight parts designed to investigate how the students felt about their own performance and the presentation activity itself (see Appendix D). Other goals of self-reporting were to make the students aware of the importance of both preparation and practice for making good public presentations and to enhance student learning outside of the classroom. Therefore, the focus of self-recording was on reporting both student work processes and future goals (outside of the current classroom) related to their performance. The eight self-record sections were as follows:

1. Goal of presentation. In this section, the students described what they aimed to achieve during performance of their presentation in a couple of short sentences.

2. Self-report of how the students prepared for each presentation (yes/no questions). In this section, the students reported what they did to prepare for giving their presentations in English. For this purpose, they gave "yes/no" responses to a series of statements, which is introduced below.

These “yes/no” statements were based on the tasks the students were instructed to attempt during the preparation period. The statements in this section differed from presentation to presentation in accordance with the presentation theme and aim so that students would notice what they needed to do during the preparation period and how they could improve the presentation quality. There was also space to write what the students did during the preparation period so that they could consider what they should do from their own perspectives.

In April, the theme and statements focused on making understandable English sentences and presentation techniques, while the theme in July concerned improving presentation content and structure. November’s instruction and theme emphasized the importance of the audience and their interest, while the last presentation encouraged the students to decide what they should do from their own perspectives. The “yes/no” statements were as follows:

May:

a. I understood English sentences in the textbook.
b. I tried to explain using my own vocabulary. (If yes, describe in detail.)
c. I checked pronunciation and accent. (If yes, describe in detail.)
d. I made marks on the script to help myself read more fluently.
e. I practiced reading. (If yes, how many times in total?)
f. I checked my recorded speech. (If yes, how many times?)

g. I tried to memorize the script as much as possible.

July:

a. I conducted in-depth research about my topic.

b. I researched topic information using the Internet and magazines as resources. (If yes, describe in detail.)

c. I referred to textbooks and other books during my research. (If yes, describe in detail.)

d. I revised the speech structure of my speech to make it more comprehensible.

e. I tried to give explanations using my own vocabulary.

f. Others (please add anything else you may have done during preparation).

November:

a. I decided on an audience to whom I will give my presentation. (If yes, who are your audience?)

b. I understood my topic very well.

c. I organized the speech (presentation) to match the level of understanding of my audience.

d. I researched the information that would make my speech (presentation) more persuasive and attractive to my audience.

e. Others (write about anything else you may have done during preparation).

December:

a. What did you do during preparation? (Please write about anything you may have done that seems relevant.)

3. Self-report of performance (yes/no questions). In this section, the students reported what speech techniques they tried to apply and whether they thought they had performed well during the presentation. There were four statements about speech techniques; for each technique, the students gave "yes/no" responses to two questions: (1) Did you try to apply this technique? (2) Do you think you performed well? The four statements introducing the speech techniques were as follows:

a. I spoke with enough volume.

b. I made appropriate eye contact.

c. I stood with good posture.

d. I was aware of my accent and pronunciation.

4. Feedback concerning the students' own performances. In this section, the students made comments about how they felt during their presentations and what they thought about their own performance.

5. Reflection (May–November). In this section, the students described what they believed they should have done during the preparation and presentation.

6. Comments on own videotaped performance (only in May and December). The instructor (author) video-recorded the first (May) and the last (December) presentation and set aside some time (about one minute in each class) so that students could check their own video-taped performances and evaluate them objectively. After checking the videos, the students wrote what they found and thought about their own performance.

7. Goal for next presentation/overall comments (written questionnaire). From May to November, the students set their goals for the next presentation, whereas in December they wrote comments and self-evaluations about their performance for the whole year (May to December).

8. Self-evaluation (quantitative). This section used quantitative data. The students evaluated their satisfaction with their preparations on a 5-point, Likert-type scale. Items were as follows:

a. I prepared the English script well.

b. I practiced hard.

c. I researched the content of my presentation.

d. I want to work harder on my next presentation./I wish I had worked harder on my presentation.

In December, the participants responded to the second statement shown in part (d) above because it was the last response point of the study.

7.2.3 Process of Qualitative Analysis

This section introduces the analysis procedure for the written responses. Qualitative analysis was conducted by referring to the modified grounded theory approach (M-GTA; Kinoshita, 2003, 2007). Compared to conventional GTA (Strauss & Corbin, 1998), M-GTA is considered a simpler analytical procedure and more convenient to apply for analyzing qualitative data (Kinoshita, 2003). Therefore, this author chose to conduct the analysis using the analytical worksheet method described below.

1) The written statements and reflections from the four learning self-report

sheets were collated for each individual student (Figure 7-1). The colors of written responses corresponded to the submission date (May, July, November, and December).

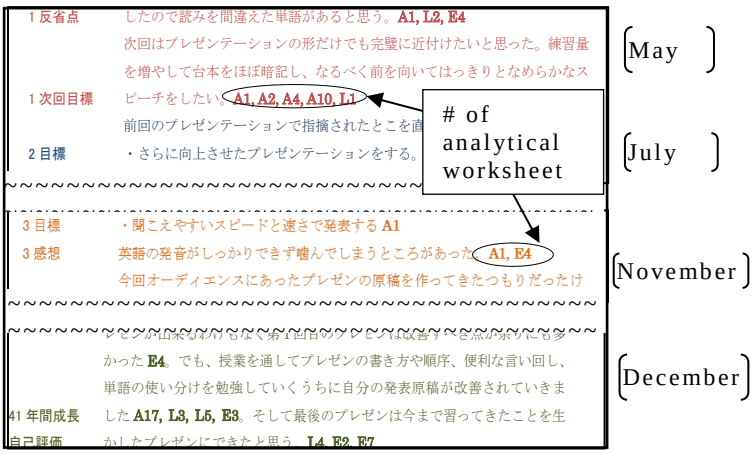

Figure 7-1. An example of a collated individual self-report sheet.

2) As described above, the modified grounded theory approach (M-GTA; Kinoshita, 2003, 2007) was applied to conduct a qualitative analysis. Unlike the conventional grounded theory approach (Strauss & Corbin, 1998), in which data are broken down and examined for the first open coding procedure, M-GTA uses an "analytical worksheet" (Figure 7-2) when open coding. An analytical worksheet allows researchers to include their interpretations, to record their perspectives, and to note analytical implications as they carry out the coding procedure. According to Kinoshita (2003), researchers should observe the data and set analytical themes that are based on the research questions in order to ensure a clear focus and direction of interpretation.

As indicated in Figure 7-2, a researcher interprets the meanings of one or more sentences and codes them according to their analytical themes. Then,

one analytical work sheet (file) is made for one code. On the top of the analytical work sheet, the analytical theme (focus), code number, and code name are presented. Below the code name, the description of the code is written in order to ensure a clear and consistent focus. As a variation, all statements analyzed in the code are copied to the analytical worksheet. When copying the statements to the analytical worksheet, it is also recommended that the code number be recorded on the original text data, which in this study was a collated individual self-report sheet (Figure 7-1). On the bottom of the analytical worksheet, the researcher's idea and the implications of the statements are recorded as theoretical notes for further interpretation.

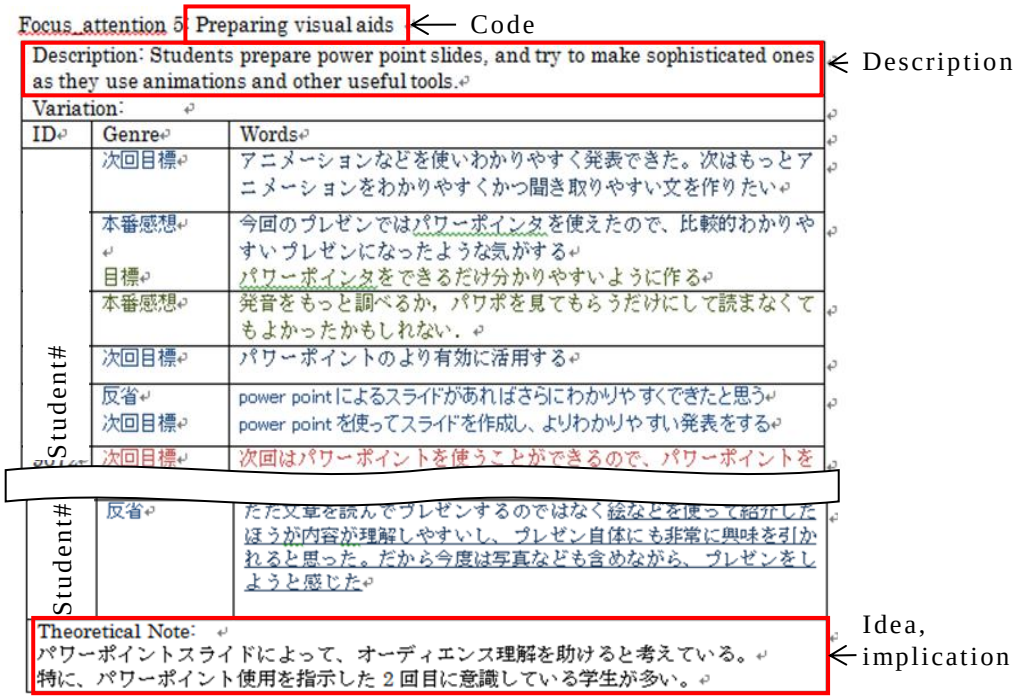

Figure 7-2. An example of a concept worksheet.

7.3 Results and discussions

In this section, results are introduced and discussed in relation to the research questions posed earlier and the analytical themes.

7.3.1 Engineering students' evaluation of their presentation preparation and performance

Research Question 1 ("What kind of statements would engineering students make about their presentation and preparation, and how would the statements change as students experience presentations?") formed the basis of an analytical theme identified as engineering students' evaluations of their presentation performance and preparation. In relation to this analytical theme, written statements about the presentation's goal, feedback items concerning their own performances, reflections, comments on own videotaped performances, and goals for the next presentation for each learning self-record sheet were analyzed, and 17 analytical worksheets (one corresponding to each code) were completed. Then, these codes were abstracted to four higher order categories. Table 7-1 introduces the categories, codes comprising each category, and descriptions of each code (the analytical worksheet). The code is written at the top of Figure 7-2, while the description is introduced under the code in Figure 7-2.

Table 7-1

Categories, Codes, and Descriptions in Engineering Students' Evaluation of Their Presentation Preparation and Performance

Category	Codes	Description
Presentation technique	Delivery	Being aware of pronunciation, prosody, speed, or English-like speech
	Physical movement	Being aware of eye contact and posture
	Voice volume	Being aware of voice volume
	Memorizing script	Considering it important to memorize script for better performance
	Script preparation	Considering it necessary to prepare script sheets that will support good performance
Clarity of message	Effective visual aids	Considering making (sophisticated) PowerPoint slides and using animations to aid the audience's understanding
	Understandable English	Being aware of using understandable English
	Communicating message	Being aware whether audience could understand them or not
	Language Choice	Thinking of correct English, grammar, vocabulary choice, and expression for the audience's understanding
Content	Organization	Working to improve the presentation structure
	Content	Commenting about the quality and detail of content
	Audience interest	Considering it important to interest and entertain the audience
	Research	Considering it important to do research to prepare the content of the speech
	Business setting	Being aware of the business setting and speech target
Preparation	Teamwork	Being aware of cooperative work with their team-mates
	Practice and Rehearsal	Planning to practice reading and to rehearse with team-mates for better performance
	Preparation	Considering spending more time on preparation

A close examination of the analytical worksheets indicated that some codes and categories appeared more frequently at certain times, while others appeared more consistently. The methods of M-GTA and GTA do not quantify data; rather, they highlight the relationships between codes and categories. However, as mentioned earlier, this author chose to count the number of statements comprising each code in each presentation in order to draw a clearer picture of changes of students' attention during presentation and preparation through experiencing presentation opportunities. In this study, a statement appearing in one section of a self-record sheet was counted only once, even when it contained several code-related words, and the number of sections containing each code was counted. To examine changes in student attention, the number of statements related to the codes in each category was totaled and compared for each month, and the proportion of each category was compared between the four presentations.

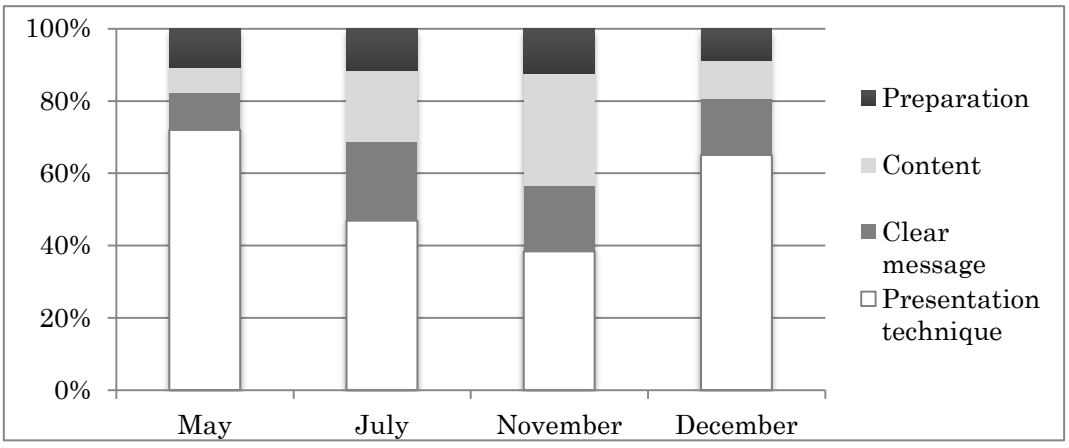

Figure 7-3. Changes in the proportion of statements in each category.

Figure 7-3 shows changes in the proportion of statements representing each category to the total number of statements. While the ratio of statements

about presentation technique did not increase over time, the proportion of statements about content and clear message increased in July; the rate of content statements increased further in November. In December, there was an increase in the ratio of statements about presentation technique. The proportion of statements concerning preparation did not vary substantially over time.

Figures 7-4 to 7-7 represent how the number of statements that were analyzed and assigned the same code changed. Figure 7-4 shows that the number of statements about presentation technique including physical movement, voice volume, and memorizing script decreased dramatically from May to July, although the statements about delivery showed less change. Figure 7-5 indicates that the number of statements about effective visual aids, communicating a message, and language choice showed large increases in July, while the number of statements about understandable English decreased overtime. Figure 7-6 indicates that the number of statements about content and research increased in July, while statements about audience interest and business settings dramatically increased in November. Figure 7-7 shows that statements about teamwork increased in July, while statements about the other codes decreased over time.

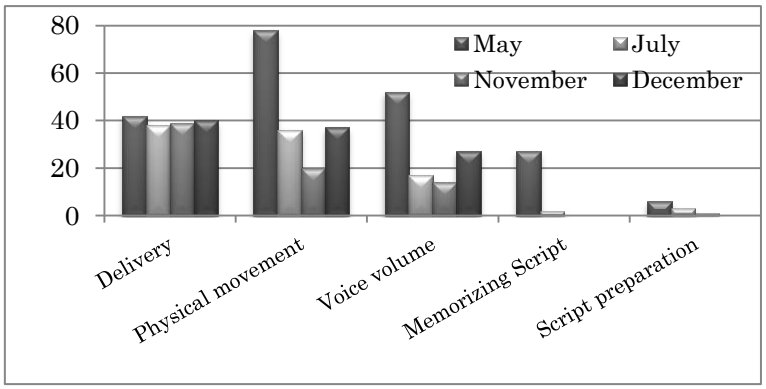

Figure 7-4. Changes in the number of statements for each code (Presentation technique).

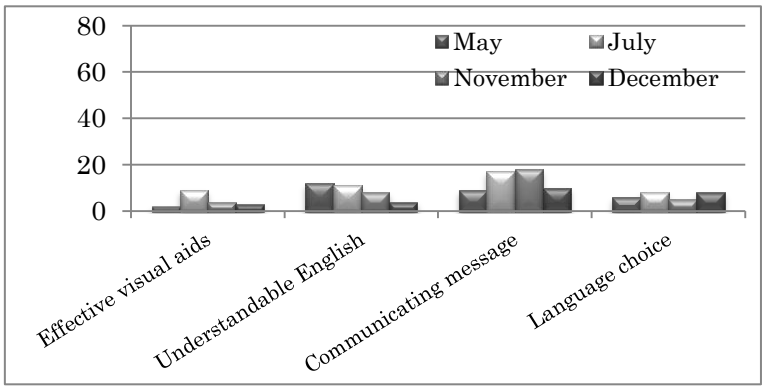

Figure 7-5. Changes in the number of statements for each code (Clarity of message).

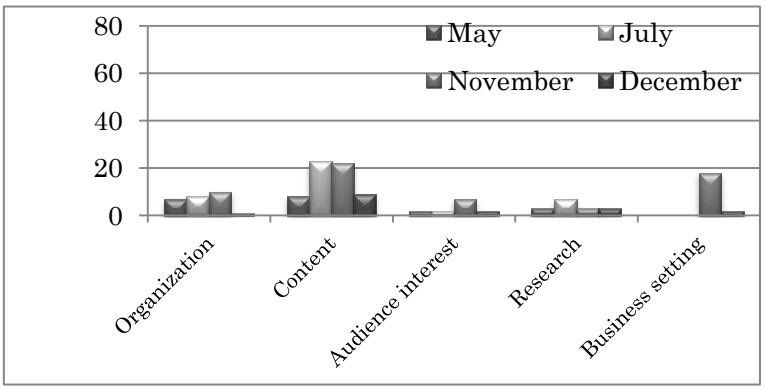

Figure 7-6. Changes in the number of statements for each code (Content).

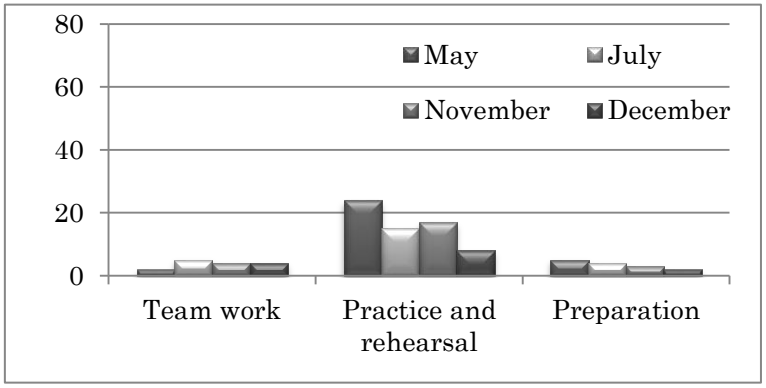

Figure 7-7. Changes in the number of statements for each code (Preparation).

In May, the students mainly focused on presentation techniques, and practice and rehearsal. The statements concerning the presentation techniques mainly appeared in the students' feedback concerning their own performances; their comments on their own videotaped performances mostly expressed how poor their performance was (e.g., "During my presentation, I followed the script and could not look up. I did not give a smooth speech because I lacked practice," "My voice was softer than expected, and I kept my face down"). In contrast, the statements concerning practice and rehearsal appeared to be solutions to improve poor performance; for example, memorizing the script to improve eye contact, practicing reading and checking the recorded speech for volume level and smoothness (e.g., "I would like to increase practice time, memorize most of the script, look directly at my audience, and give a clear and smooth speech," "I will try to make my voice louder by practicing reading more loudly, asking someone to listen to my speech beforehand, and reviewing my recorded speech"). By the May presentation, the students seemed to have recognized the difficulty of public speaking, showed regret for their lack of preparation, and noticed the importance of practice by analyzing the reasons for their poor performance.

In July, the number of statements related to presentation techniques decreased, and the comments became rather positive as the students noticed improvement in their own performances (e.g., “I was more aware of looking up than in the last presentation. My voice sounded louder,” “I was happy to be more relaxed and paid more attention to eye contact and posture than the last time”). On the other hand, statements concerning clarity of the message and content increased dramatically and mostly expressed regret (e.g., “I should have described the appearance and size of the presentation product with a specific number. It might have been better to explain the problem points with more in-depth solutions,” “I would probably have made my speech more understandable if I had used the Power Point slides”). At this point, the students seemed to have noticed some improvement in their speech techniques by comparing their present performance with the May speech and by shifting their attention more to speech quality and the effective delivery of their messages to the audience.

In November, the statements concerning their presentation techniques showed dissatisfied reflections on their performances (e.g., “I could not pronounce some words and stumbled over them,” “I concentrated so much on the script that I did not pay enough attention to looking up and around”). The number of statements analyzed in communicating the message and content was approximately the same as in July, while this month’s comments were more about the business setting and audience interest (e.g., “For this presentation, I intended to write a script that would suit the audience, but during the presentation, I noticed my script was not appealing enough to them. I want to put priority on that issue,” “I will give a presentation appropriate

for a specific target"). At this point, some of the students were not satisfied with their performances and expressed regret. In July, the statements expressed satisfaction, but they were satisfied with their awareness. In contrast, the November statements concerned the quality of the performances themselves, and the students seemed to hold some ideal image of giving a presentation in English, such as perfect pronunciation and adequate eye contact. This month, they also became more concerned about attracting the attention of their audiences.

In December, the total number of statements decreased, and statements related to presentation techniques increased again, probably because the students had watched their own videotaped performances, and reflected on them (e.g., "I should have stood up straight (even when I was not speaking) and spoken with clearer pronunciation and a more cheerful expression," "The impression was that my eyes were downcast more often than I expected, probably because of nervousness. I was relieved that my pronunciation was easier to understand than expected, but I felt I could have been louder"). Although the students were not fully satisfied with their performances, they also expressed a sense of accomplishment (e.g., "In this presentation, I felt less nervous than during the first one. I thought this performance was my best. However, I could not pronounce the English words very smoothly," "Because I did more in-depth research and practiced harder, I think my presentation was good. However, nervousness was not reduced at all"). Since it was the final presentation of the course, the students seemed to hold some ideal images of themselves giving the presentation. They worked hard, and expected themselves to perform well; however, the actual videotaped performance

might have been a little beyond their expectations.

After each presentation, the students reflected on it, analyzed it, and identified strategies or solutions to acknowledged problems. In May and November, the statements expressed more regret than satisfaction, while the statements in July and December included satisfaction and accomplishment. However, the November statements were more concerned with performance quality itself, while the July statements showed satisfaction with the students' awareness and voice. The students may have held their ideal image of giving a presentation in English more clearly and may have started evaluating their own performances more severely in November. Their attention gradually shifted more to the content and clarity of the message, while they kept reflecting on their presentation techniques.

Before the July presentation, instruction focused on rich content and clear explanation, while before the November presentation, the focus was on attracting audience interest and being aware of audience comprehension. Moreover, the preparation part of the self-record sheet (7.2.2-2) consisted of questions related to these taught themes. Therefore, the students' attention and the contents of their statements may have been influenced by classroom instruction, and the structure of the self-record sheet may have worked as scaffolding to help them become aware of what was needed for better presentation.

This possible influence and the overall patterns in the students' responses suggested that the answer to Research Question 1 ("What kind of statement would engineering students make about their presentation and preparation, and how would the statements change as students experience

presentations?") was as follows. When the engineering students reflected on their performances by recording their self-reports, they felt a sense of improvement, satisfaction, or regret. As they recognized improvement or satisfaction, they shifted their attention more toward content and audience, although they were constantly aware of their presentation techniques. When they recognized improvement and were satisfied with it, their psychological needs for competence may have been satisfied, as expected according to the self-determination theory. In other words, the engineering students worked to improve the total quality of their presentation, and as a result, their psychological needs for competence were satisfied. As a consequence, they began to place more emphasis on the information to be conveyed and on the goal of communicating that information. While they tried to perform better, they envisioned the ideal image of giving a presentation in English. In response to their feeling of regret, they analyzed the reasons for it and determined strategies to make a better presentation in the future. Although the students' changing statements may have been influenced by the classroom instruction and scaffolding according to the self-record sheet content, the results suggest that the engineering students began to view English as a tool for communicating with others, and they began to envision their ideal image of giving a presentation in English. Thus, they engage in their preparations with much more effort.

7.3.2 Changes in students' preparation efforts

To examine how the students' efforts in preparing their presentations changed, the section was designed to present a quantitative analysis of the

learning self-record sheet. Three 5-point Likert-type scale items were analyzed using SPSS version 16.0. These items were “I prepared the English script well,” “I practiced hard,” and “I researched the content of my presentation.” Table 7-2 and Figure 7-8 show the descriptive statistics and results of repeated measures ANOVA with time. Items “I prepared the English script well” and “I practiced hard” showed statistically significant increases from May to December, even after applying a Bonferroni adjustment. The *F*-value of the item “I researched the content of my presentation” showed a slightly significant increase from May to December, and partial η^2 suggested that the increase was large enough.

Table 7-2

Descriptive Statistics and Results of a Repeated Measures ANOVA With Time for Students' Efforts in Preparing Presentations

	May	Jul	Nov	Dec	*F*	*p*	Partial η^2
Preparation	3.46 (0.90)	3.37 (0.74)	3.50 (0.92)	4.21 (0.50)	9.14	<.001	.28
Practice	2.92 (1.06)	2.74 (1.06)	3.07 (0.90)	3.68 (0.86)	7.77	<.001	.24
Research	3.58 (0.95)	3.93 (0.83)	4.07 (0.86)	4.24 (0.72)	3.80	.014	.15

Note. Preparation = “I prepared the English script well”; Practice = “I practiced hard”; Research = “I researched the content of my presentation.”
* $p < .016$.

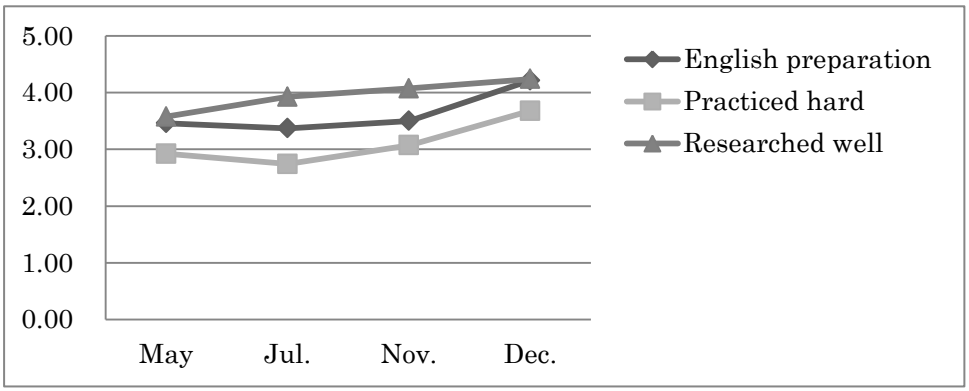

Figure 7-8. Changes in students' efforts in preparing presentations.

These results show that the engineering students seemed to perceive that they had begun to put more effort into their presentation preparation and self-evaluated their efforts. Therefore, the answer to Research Question 2 ("How would engineering students' effort change as they experience presentations?") would be that the engineering students became more actively engaged in preparing for their presentation.

7.3.3 Perceived growth and learning through English presentation activities

With reference to Research Question 3, the section of overall comments in the December learning self-record sheet was analyzed, and analytical worksheets were devised according to M-GTA theory (as described in section 7.3.1). Fourteen analytical worksheets (one corresponding to each code) were completed, and the given codes were abstracted to three higher order categories as follows: *reflection of inexperienced self*, *recognition of learning and growth*, and *linking for further learning*. Table 7-3 introduces the three categories, the codes comprising each category, and examples of the

students' statements that were analyzed and assigned each code. Since the statements were provided in Japanese, the information in the table is presented in both Japanese and English (as translated by the author). The Japanese responses and comments are direct copies of the original text, and therefore may contain language errors. Five codes have been classified as fitting into *reflections of the inexperienced self*. The five codes are *inexperienced presentation*, *lack of content and English proficiency*, *nervousness*, *lack of confidence,* and *confident from the beginning*. The *recognition of learning and growth* category consists of six codes: *improved presentation technique*, *improved English composition skill*, *acquired communicating skills*, *gained confidence*, *familiarity with giving presentations*, and *relatedness*. The final category, *linking for further learning* comprises three codes: *remaining problems*, *future learning*, and *imagined business settings*.

Table 7-3
Categories, Codes, and Statement Examples of Perceived Growth and Learning Through English Presentation Activities

Code	Statement (Japanese) examples	English Translation
	Category: Reflections of the inexperienced self	
Inexperienced Presentation	始めのころは下を向いた発表だったし発音に対してもあまり意識できていませんでした。	At first, I kept looking down during the presentation, and I was not conscious of pronunciation much either.
	最初は緊張して周囲を見れず、スピードが上がってしまっていた	At first, I was so nervous that I could not look around and talked too fast.
Lack of content and English proficiency	初めは内容もスピーチもぎこちなかった。	At first, both content and performance were awkward.
	初めのうちは少しの文章でも英語にするのに時間がかかった	At first, it took a while to translate even a small amount of sentences to English.
Nervousness	最初の発表では原稿がプルプル震えるほど緊張していた	In the first presentation, I was so nervous that my hands were shaking.
	最初の段階は、自分で思っているより緊張していた。	At first, I was more nervous than I expected.
Lack of confidence	人前で発表をするという経験が今まで数えるくらいしかなかった自分がましてや英語でなんて果たして出来るのかと思っていたが	I had few opportunities to give a presentation for people before, so I wondered if I could present, let alone in English.
Confident from the beginning	発表すること自体には自信があった	I was confident to give the presentation itself.

Table 7-3 continued

Code	Statement (Japanese) examples	English Translation
	Category: Recognition of learning and growth	
Improved presentation technique	人の発表を何度も聞いたことによって，聞く人に対してどのくらいのスピードで，どのくらいの大きさで読めばいいかわかるようになり，それを実行していくことができた.	By repeatedly listening to other people's presentations, I have learned how fast and how loud I should talk to people and could therefore perform well
	落ち着いて周囲を見渡しながら発表できるようになったと思う。英語の発音も良くなったと思う。	I feel I have become able to present while looking around in a calm manner. I also think that my pronunciation has improved.
Improved English composition skill	英語でプレゼンをする機会が今まで無かったので、この授業で経験できたことにより英語で自分の考えを表現するという点が上達したと思います。	I had few opportunities to give presentations in English before; through experiences in this class, I have improved in my ability to express my ideas in English.
	英文が簡潔にまとめられるようになった	I have become able to make concise English sentences.
Acquired communicating skills	一年間を通じてプレゼンをしてきたことによって，以前の自分より物事を他人に伝えようとする能力は高まったと思う.	Through experiencing presentations for a year, I think my skill to communicate something to others is improved compared to before.
	聞き手がどういうことを知りたいか、どの程度なら皆が理解できるかなどを考えることが出来るようになってきている。	I have become able to consider what audiences want to know and how well an audience can understand me.
Gained confidence	自信がついたのが良かったです	It's good that I gained confidence.
	しっかりとした準備をして、その成果を発表することに大きな自信と達成感を感じられるようになりました。	I felt a sense of confidence and achievement when working hard on preparing and presenting my work.

Table 7-3 continued

Code	Statement (Japanese) examples	English Translation
	Category: Recognition of learning and growth	
Familiarity with giving presentations	プレゼンテーションというものに慣れてきたことが何よりも成長した点だと思っています。	I have seen most improvement in feeling familiar with giving presentations.
	台本を作るのにこの１年間で少しは慣れられたと思います。	I became familiar with making scripts a little more through this year.
Relatedness	グループで何か一つのものを作り上げようと協力することもできたと思う	I could work in collaboration with a group to make something.
	Category: Linking for further learning	
Remaining problems	どうしても，人前だと緊張し，失敗したくないという思いが強く, 台本に目を落とす時間が最初よりも多少短いが, やはり長くなってしまっているというのが, 結局直せなかった部分でもあり，今後の課題です.	In front of an audience, I cannot help being nervous and wanting to avoid making mistakes; therefore, I tend to keep looking at my script even though it has become a little shorter. This is what I could not improve and will be my challenge for the future.
	声はまだ小さい	My voice is still soft.
Future learning	もっと文法的なことや専門用語についても勉強していきたいと思う。	I want to learn more grammar and technical terms.
	今度プレゼンテーションをするときには頑張らなければいけないと思う。	I should work harder for the next presentation opportunity.
Imagined business setting	プレゼンは今後会社に入ってからもあると思うので､とてもいい授業を受けることができたと思う。	I may have opportunities to give a presentation when I start working in future; thus, I think this class was very good.

When the students evaluated their own growth, they first reflected on their presentation in May (category named *reflection of inexperienced self*). They explained that they were not content with their performances, that they were inexperienced (e.g., “At first, I kept looking down during the presentation, and I was not conscious of pronunciation much either”), and they were not satisfied with the presentation content or the English language (e.g., “At first, both content and performance were awkward,” “At first, it took a while to translate even a small amount of sentences to English”). Many of them revealed that they had felt nervous or lacking in confidence (e.g., “At first, I was more nervous than I expected,” “I had few opportunities to give presentations to people before, so I wondered if I could present, let alone in English”), although some stated they felt confident about the presentation from the beginning (e.g., “I was confident to give the presentation itself”).

Many seemed to recognize how, and in what skills, they had improved, and they noticed their growth by comparing their current performance with their earlier ones (category named *recognition of learning and growth*). In terms of growth and learning, the students perceived improvements in their presentation techniques (e.g., “I feel I have become able to present while looking around in a calm manner. I also think that my pronunciation has improved”); English composition skill (e.g., “Through experiences in this class, I have improved my ability to express my ideas in English”); and communicating skills (e.g., “Through the experience of giving presentations for a year, I think my skills in communicating things to others have improved as compared to before”). They also stated that they had gained confidence (e.g., “It’s good that I have gained confidence”) and became more

experienced presenters (e.g., “I have seen the most improvement in feeling familiar with giving presentations”). Some mentioned collaborative group work and expressed satisfaction (e.g., “I could work in collaboration with a group to make something”). The students’ psychological needs for competence seemed to be satisfied through recognition of their growth, as expected according to the self-determination theory. Their needs of relatedness were also fulfilled through successful group activities. The students also made statements discussing their future learning and possible presentation opportunities (e.g., “I may have opportunities to give a presentation when I start working in the future; thus, I think this class was very good“; “I will work harder for the next presentation opportunity”), although this was the last presentation in this class.

In addition to the statements presented in Table 7-3, there were other statements with which the students described their expectations of the future presentation opportunities and stated specific challenges (e.g., “I want to study grammar and technical terms more”; “I expect to have opportunities to give English presentations in the future, so I want to remember what I learned through the presentation and apply it at the next opportunity”; and “My explanation was a little vague, so I want to make my future presentations more detailed and clear”). In these statements, the students indicated their imagined English-using situations, namely the imagined international discourse community, and their self-image of using English in these situations. Therefore, the answer to Research Question 3 (“What kind of growth and achievement would engineering students perceive through experiencing English presentation activities?”) is as follows. Engineering students

recognized the improvements in their speech performances and felt a sense of accomplishment, which satisfied their psychological need for competence. They were also satisfied with their successful collaborative group work, which fulfilled their psychological need for relatedness. As they experienced the English presentation, they visualized future English-using situations, constructed images of their future ideal and ought-to selves as English-using engineers, and linked these images to further learning.

7.4 Overall discussion

The results presented in this chapter indicate that the engineering students in this study increasingly considered English as a tool for communication with others when experiencing English presentation activities in a one-year course, although there might be other factors that influenced these students. The results of Study 3 (Chapter 6) suggest that the engineering students' three psychological needs of autonomy, competence, and relatedness were satisfied through experiencing English presentation activities. In particular, the satisfaction of competence needs through experiencing English presentation activities was found to promote engineering students' highly self-determined extrinsic motivation to learn English for their future career. Based on these results, Study 4 used qualitative data of the students' statements for analysis and revealed the process by which English-presentation activities satisfied the engineering students' three psychological needs. Figure 7-9 summarizes the results of Study 4, and represents the process and mechanism by which the engineering students' motivation changed through the course as their three psychological needs

were met. As the engineering students worked on their presentations, they started to devise ways to improve their presentation scripts and performance of their own accord; they began to devote more effort to preparation and felt the satisfaction of autonomy through exercising their own initiative. As they put effort into practice and preparation, they felt a sense of achievement. As a result of this effort, they were able to acknowledge self-growth by comparing their current performance with their earlier ones, which satisfied their needs of competency. Finally, accomplishing a good performance through working in a group satisfied the psychological need of relatedness. As the students perceived their growth, they started to visualize future English-using situations, which may lead to the construction of their ideal and ought-to self-images as English-using engineers. The fact that the students identified their challenges and set them as their learning goals for the future also indicates a motivation to continue to learn English in the future. This process may represent how this English presentation-based course functioned as an imagined international discourse community for the engineering students.

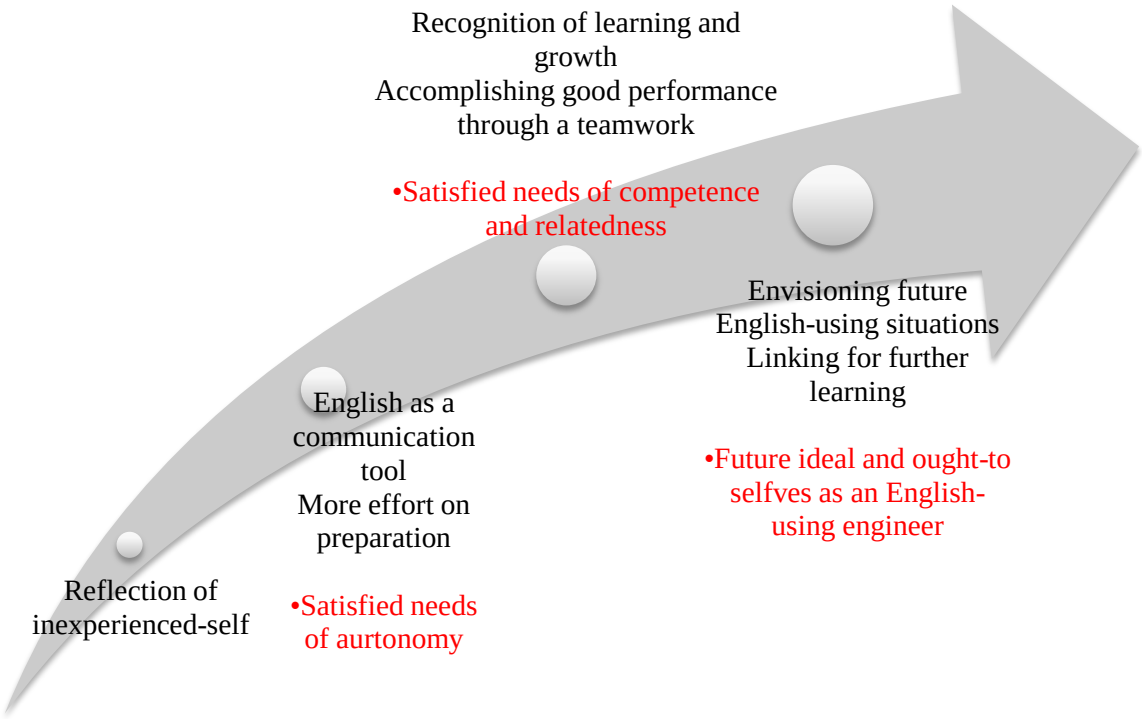

Figure 7-9. The changing process of engineering students' motivation to learn English through experiencing English presentation activities.

7.5 Conclusion

This study revealed the process by which the engineering students began to consider English as a communication tool, and how their motivation and effort to participate in English presentation activity changed. The results suggest that the engineering students could visualize what needs to be learned for interacting with other people and construct their ideal and ought-to self-images as English-using engineers. Thus, the English presentation activity and language used in this activity may have become more meaningful for them. These results reflect the quantitative results of Study 3, in which the engineering students gained confidence in their English skills and recognized English learning as a meaningful activity through an English presentation-based course. Study 3 also revealed that satisfying the need of

competence through the course influenced identified regulation, which may have promoted autonomous learning. The results of Study 4 support the importance of satisfying the three psychological needs, especially competence, suggested in earlier findings. Moreover, considering the results of Studies 3 and 4 together, it is possible that the satisfaction of autonomy and competence are interrelated and create a synergistic effect on both students' vision of the ideal and ought-to self-image as an English-using engineer and their English learning motivation.

As they constructed their ideal self-images as English-using engineers, the students showed a willingness to further their learning. This may mean that tehy began to feel the sense of belonging in their imagined international discourse community and see themselves as acquiring the necessary knowledge to be members of the community.

Note

1. Nishida (2011) also chose to count the number of emerging codes so she could more clearly see the changes in classroom interaction patterns.

8. Conclusion

This dissertation has discussed the process and mechanism of how engineering students become motivated and actively engage in learning English by empirically studying the effects of educational intervention. Based on theories of English for specific purposes, communities of practice, and imagined communities, the author implemented English presentation activities as an example of creating an imagined international discourse community in a classroom and examined motivational effects of this classroom intervention by using two theoretical frameworks: the L2 motivational self-system and self-determination theory.

In section 8.1, the author will summarize the results of Studies 1-4 in terms of the research objectives posed earlier (in section 2.3). After that, the limitations of these studies will be discussed in section 8.2. On the basis of these results and limitations, the author then outlines some research and pedagogical implications in sections 8.3 and 8.4. The last part will summarize the whole dissertation.

8.1 Major findings

In this dissertation, the author conducted four studies: one cross-sectional and quantitative (Study 1), two longitudinal and quantitative (Studies 2 and 3), and one longitudinal and qualitative (Study 4). Figure 8-1 re-presents the dissertation design and brief summaries of each study. Then, in this section, the author reviews the objectives and summarizes the results of each study.

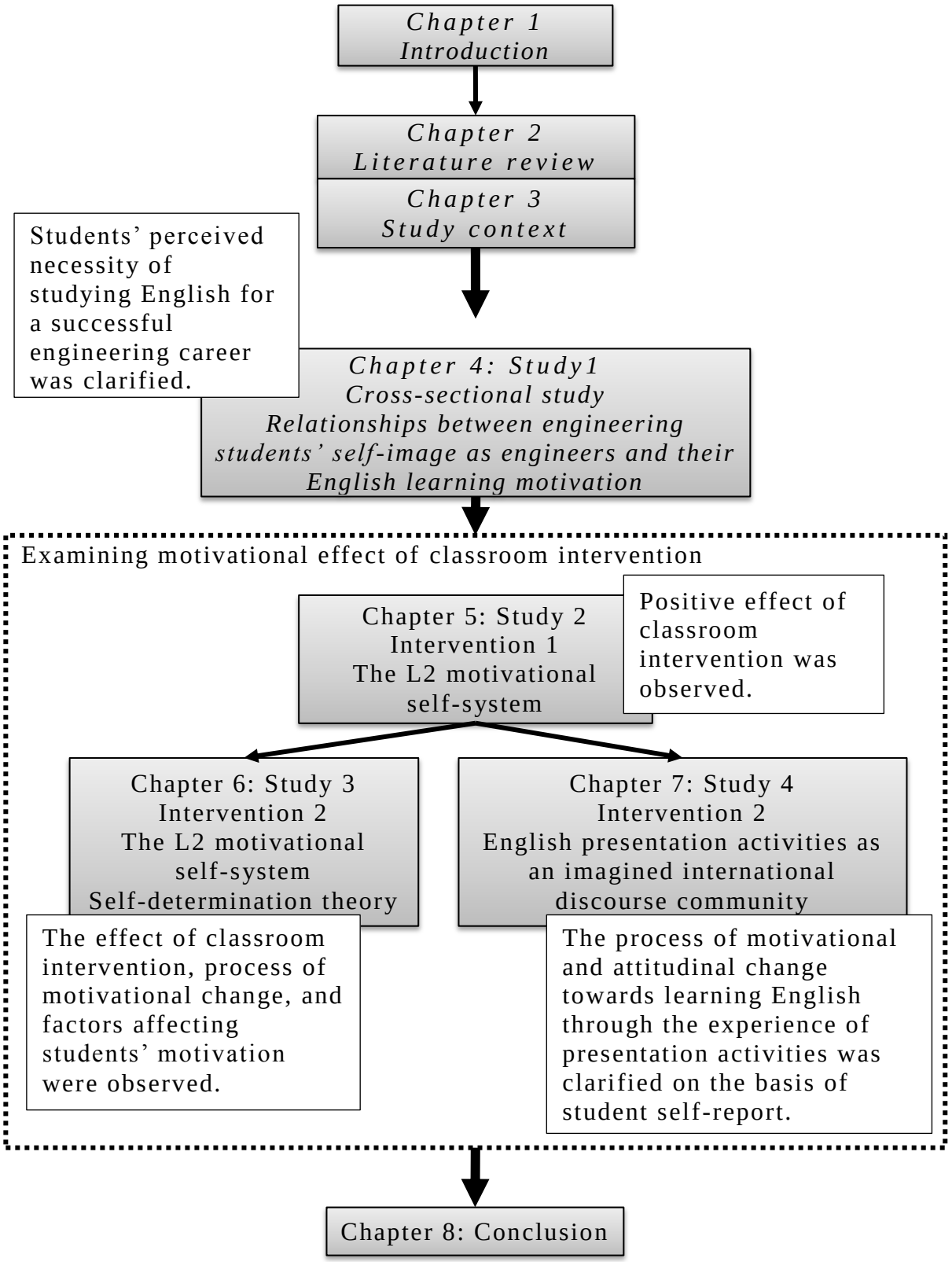

Figure 8-1. Dissertation design and brief summary

Study 1 examined whether there was a relationship between engineering students' ideal self-images as future engineers and those as English users and their motivation to learn English.

Study 1 focused on how engineering students' self-image as future engineers relates to their self-image as English users and to their English learning motivation. A cross-sectional study was conducted using the L2 motivational self-system and self-determination theory as theoretical frameworks. The results revealed that the engineering students in the study seemed to recognize a certain level of relationship between one's English skills and becoming a successful engineer and perceive the importance of studying English to achieve their career goals. Although one's self-image as an engineer may not be directly related to his or her intrinsic motivation to learn English, the results suggested that a clear self-image as an engineer generates highly self-determined extrinsic motivation to learn English.

Study 2 assessed the effects of an English presentation-based course on engineering students' L2 learning motivation and examined the resulting change in their ideal self-image as English users.

In Study 2, the L2 motivational self-system was used as a theoretical framework, and the motivational effect of an English presentation-based course intervention was examined by using a pre-post survey. It was revealed that the participating students became less anxious about using English in a classroom setting as a result of the intervention and that they significantly gained confidence as English users. These results suggest the effectiveness of English presentation activities in motivating Japanese engineering students to study English.

Study 3 examined the process and mechanism of motivational change among engineering students taking an English presentation-based course.

Based on the results of Study 2, Study 3 used both the L2 motivational self-system and self-determination theory to longitudinally investigate the process and mechanism of engineering students' motivational changes as a result of their experience of English presentation activities. The results revealed that the English presentation-based course satisfied three key psychological needs (autonomy, competence, and relatedness) among the participating students to a greater degree than their previous English courses had. Further, the participants came to perceive their English competence as higher and to believe learning English was more meaningful after engaging in the English presentation activities. It was also clarified how satisfaction of the psychological need for competence influences motivation. Satisfaction with one's competence as a result of participating in English presentation activities seemed to promote highly self-determined extrinsic motivation in English learning among the participating students. Moreover, the result revealed that the course increased the intrinsic motivation of the students who were initially least-motivated. Overall results suggest that the English presentation-based course was effective in raising these Japanese engineering students' motivation to a more self-determined level.

Study 4 explored more microscopically how English presentation activities served as an imagined international discourse community.

Study 4 used qualitative data to achieve a more in-depth explanation of the process and mechanism of the motivational changes revealed in Study 3. The results of qualitative analyses (supplemented by quantitative analyses)

revealed the process by which the engineering students came to view English as a communication tool and how they began to actively engage in the presentation activities. An analysis of the students' self-report statements showed their views on the satisfaction of three psychological needs as well as how they constructed ideal and ought-to self-images as English-using engineers by participating in the English presentation activities and reflecting on their own effort and performance. The students stated that they were willing to further their learning after finishing the course. Thus, overall, this study clarified how English presentation activities serve as an imagined international discourse community for engineering students.

8.2 Limitations and further studies

The studies discussed above have several limitations that should be considered, however. First, the number of participants in Studies 2 and 3 was not large enough. The results of statistical power analysis for Study 2 suggested that the actual sample size was slightly more than adequate, while the projected sample size for Study 3 was larger than the actual data size. Therefore, the results might contain errors. This limitation emerged due to the characteristics of longitudinal studies, in which some students could be absent in one survey, and the number of students enrolled in the class. (This implies that the results may differ if the answers of students who participated in only part of the longitudinal study are included in analysis.) Moreover, there were some items exhibiting ceiling or floor effects, and categories or factors with low reliability. Including these items, categories, and factors might have interfered with statistical accuracy.

Second, the analysis conducted for this dissertation mainly related to change of motivation and of students' perceived competence; neither changes in English skills nor language proficiency through classroom intervention were studied. To get a full picture of the educational effects of an English presentation-based course, it may be necessary to analyze changes in the English expressions used in the presentation script made by students or characteristics of their pronunciation on the basis of video-recording of their presentations. The use of a standardized exam for pre-post testing of students' English skills may also be useful.

In this dissertation, the author chose English presentation activities as an example of an imagined international discourse community. Although the author believes that presentation skills are useful and necessary for students' future careers, it is also important for engineering students to acquire written English skills and reading comprehension. Thus, it may be necessary to construct an intervention and study using some imagined international discourse community rooted in the written word in order to investigate its effect on English learning motivation and English comprehension skills.

Finally, the studies in this dissertation focused only on the effect of the classroom intervention on the students' motivation to learn English, while there may have been other aspects that influenced the changing process of their English learning motivation and self-images as English-using engineers. It may be necessary to observe what part of the engineering students' motivation to learn English and their self-images as future English-using engineers the classroom intervention influenced, and in what way. Socio-dynamic perspectives may also be important for further investigation of

affective factors and the processes of change in English learning motivation.

8.3 Research contribution

The present study has several implications for future research. First, as described in section 2.1.3, the number of prior studies concerning engineering students' English learning motivation is limited. In this dissertation, the results of the cross-sectional study (Study 1) revealed the engineering students' motivational tendencies with regard to English learning, and the longitudinal studies (Studies 2, 3, and 4) revealed the students' motivational changes resulting from the classroom intervention. Therefore, this thesis contributes to the accumulation of data on engineering students' English learning from a motivational perspective and helps English instructors of Japanese engineering students better understand their students and their attitudes towards learning English.

In this dissertation, the author used two theoretical frameworks: the L2 motivational self-system and self-determination theory. As described in section 2.2.4.1, in the L2 motivational self-system, learners' future self-images as English users are made up of the ideal and the ought-to L2 selves, with the expectation that these future self-images will work as self-regulatory functions to help learners actively engage in learning. In contrast, self-determination theory focuses on the learners' present state of motivational development vis-à-vis the type of regulations and measures the degree to which learning is self-determined. This allows researchers to understand students' motivational development in greater detail. Although both theories illuminate some aspects of motivation, their concepts are

different. By using both theories in tandem, this dissertation contributes to the understanding of engineering students' characteristics and sheds light on the structure of their English learning motivation as described below.

In Study 1, interest in engineering materials and anxiety concerning the field of engineering were found to be significant predictors of the ought-to L2 self in the L2 motivational self-system and identified regulation in self-determination theory, while the ideal professional self exhibited a significant relationship with the ideal L2 self. In Study 3, satisfaction with one's own competence through the intervention was found to have a stronger effect on the ought-to L2 self and identified regulation than on the ideal L2 self and intrinsic motivation. Identified regulation is a state in which individuals study English because the language is necessary to achieve their valued goals, making it similar to the ideal L2 self rather than the ought-to L2 self (Dörnyei, 2009). According to Dörnyei (2009), the ought-to L2 self represents one's beliefs about characteristics "that one ought to possess to meet expectations and to avoid possible negative outcomes" (p. 29). The results of the three studies suggest that the ought-to L2 self for engineering students is rather positive and clearly related to their professional goals and highly self-determined English learning motivation, namely, identified regulation. While their ideal self-image, either professional or L2, can be rather vague, the ought-to L2 self can be more realistically internalized. Therefore, the ought-to L2 self may be a realistic self-concept for engineering students that is effective at motivating them to learn English.

Study 1 identified the engineering students' motivational tendencies. In the terms of the L2 motivational self-system, the ought-to L2 self was

higher than the ideal L2 self, while in terms of self-determination theory, the mean score of identified regulation was the highest. These results contributed to showing that Japanese engineering students see learning English as an obligation and something that is important for achieving their goals.

Study 3 revealed that satisfying the psychological need for competence influences motivational regulation as defined in self-determination theory, the ideal L2 self, and the ought-to L2 self. Specifically, April results showed that satisfying the psychological need for competence influenced intrinsic motivation, the ideal L2 self, external regulation, and amotivation. However, the influence of satisfaction with one's own competence on identified regulation and the ought-to L2 self increased in July and January. These results can help us gain a more in-depth understanding of how English presentation activities influence students' motivation. When learners believe that their English skills are improving, they have clearer images of their ought-to selves as English users; then, they are more motivated to learn English to achieve their goals. English presentation activities could stimulate this psychological change.

On the basis of these results and findings, this dissertation can help researchers better understand the structure of engineering students' motivation.

A final research implication relates to the fact that this dissertation used qualitative data in addition to quantitative data. The qualitative analysis supplemented and added to the quantitative analysis by providing a more microscopic understanding of how satisfying the needs for competence and autonomy inter-relate and how satisfaction of the three psychological needs is

linked to envisioning the ideal and ought-to selves as an English-using engineer through the experience of the English presentation activities.

8.4 Pedagogical implications

The author implemented English-language presentation activities as a classroom intervention and examined the motivational changes that resulted. The findings revealed that English presentation activities helped engineering students to reduce negative attitudes such as classroom anxiety and amotivation regarding learning English. The students also felt that three psychological needs (autonomy, competence, and relatedness) were satisfied more by this activity than by the types of English instruction they had previously experienced. In particular, the satisfied need for competence influenced identified regulation and the ought-to L2 self. Activities through which engineering students can recognize their accomplishments may be important in developing their motivation to learn English. The qualitative analysis showed the students' process of reflecting on their presentation performance, devising ways to improve their presentation, and beginning to devote more effort to preparation. When reflecting on their performance, they also acknowledged their self-growth and started to visualize future English-use situations. The results also showed the process by which the engineering students envisioned an ideal or ought-to self-image as English-using engineers by participating in the English presentation activities. They learned to envision themselves giving English presentations in their future careers and to identify the necessary English knowledge and skills as well as the effort they would need to make to achieve their goals. As Wenger

(1998) observed, “if the purpose of education is […] to give *students* a sense of the possible trajectories available in various communities, then, education must involve imagination in a central way” (p. 272); this dissertation demonstrated how English presentation activities helped engineering students construct their own self-images as English-using engineers as an imagined international discourse community.

This dissertation has discussed English education for engineering students, adopting the perspectives of English for specific purposes (ESP), community of practice, imagined communities, and motivation theory. As introduced in section 2.1, English for specific purposes (ESP) has been the main field in which English education for engineering students has been discussed; there have also been struggles and gaps between what ESP instructors aim at and what students in ESP classrooms are capable of. As engineering students have various choices regarding their specialization and job opportunities but only vague images of these choices and their desired goals, this dissertation offers several suggestions, such as providing activities that students can imagine as English-use situations in the future, developing their self-images as English-using engineers through such activities, and motivating them to learn English. This dissertation also has implications for instructors of English education for engineering students for how to approach novice learners of English within their specialized fields.

8.5 Concluding remarks

In this dissertation, the author mainly focused on engineering student’s’ English learning motivation and examined the effect of

presentation activities, revealing the process by which students construct their self-images as English-using engineers. The author tried to integrate educational approaches and theories of language learning motivation, English for specific purposes, communities of practice, and imagined community and apply them in the context of English education for engineering students. As an integrated educational approach, an English presentation activity as an attempt to create an imagined international discourse community was adopted.

This approach evolved in the course of the author's teaching experience. During my ten years' teaching technical English courses, I have seen my students becoming more and more active and enthusiastic as they engage in English-language presentation activities. In the classroom, I have observed students discussing how to include new phrases in their presentations, how to make their presentations more attractive, and when to meet and practice after school. Every year, when I entered the classroom on the final presentation day, many students were standing and practicing with their partners, facing windows or walls. Their comments on the exercise provided in their student course evaluations were also very positive: they enjoyed introducing their new knowledge and felt the class to be very practical and effective. Through changes of behavior like those just mentioned, I saw my students becoming more motivated to engage in English presentation activities and learn English generally. In this global society, acquiring English is not optional but necessary for engineers; thus, non-native-English-speaking engineering students need to keep studying the language even after graduating from colleges and beginning their professional

careers.

Through the four studies presented in this dissertation, it was shown that engineering students perceive the necessity of learning English for their success in their future careers. The English presentation activities, which were intended to incorporate some of the characteristics of English-use situations that the students are likely to encounter in the future may have caused the students' attitudes to change from a focus on learning English to one on using English for communication. In other words, English presentation activities could fit both the participation metaphor and the acquisition metaphor: students establish images of themselves as engineers in the international community and begin to learn the necessary English skills. By gaining confidence and envisioning their ideal and ought-to self-images as English-using engineers, they may reduce the anxiety they feel about using English and may feel more ready to work in international settings. I hope that this course will increase my engineering students' participation in international activities.

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Appendices

Appendix A: Questionnaire for Study 1

技術英語履修者の英語及び専門学習に対する意識調査

このアンケートは、皆さんが英語及び専門教科の学習に対してどのような意識を持っているかを調査するためのものです。研究以外の目的に使われることはなく、成績には一切関係ありません。また、個人情報は必ず守る事をお約束します。正直に思う通り答えてください。ご協力よろしくお願い申し上げます。

1. あなたは英語に対してどのような意識を持っていますか。次に示す項目について、どれぐらい自分に当てはまるか考えて、完全にあてはまる場合は５に、全く当てはまらない場合は１を、あるいはその中間で、最もあなたの気持ちをよく表すところに○をしてください。

英語に対する意識変化	全くあてはまらない 全く違う				完全にあてはまる そのとおりだ
例） 英語は簡単である	1 -	② -	3 -	4 -	5
1)将来英語を使って仕事をしている自分をよく想像する	1 -	2 -	3 -	4 -	5
2)英語を勉強するのはとても面白い	1 -	2 -	3 -	4 -	5
3)英語の授業で発言していると緊張する	1 -	2 -	3 -	4 -	5
4)教養を身につけるために英語を習得するべきだ。	1 -	2 -	3 -	4 -	5
5)今の私の環境では英語がそんなにできなくてもかまわない	1 -	2 -	3 -	4 -	5
6)いつも英語の授業を楽しみにしている	1 -	2 -	3 -	4 -	5
7)英語を話せるようになっている自分をよく想像する	1 -	2 -	3 -	4 -	5
8)努力すれば、必ず英語ができるようになる	1 -	2 -	3 -	4 -	5
9)将来のやりたいことのためには英語を話す事が必要である	1 -	2 -	3 -	4 -	5
10)クラスメートは自分より英語がうまく話せるような気がする	1 -	2 -	3 -	4 -	5
11)英語は国際共通語なので勉強する必要がある。	1 -	2 -	3 -	4 -	5
12)自分は英語の習得には自信がある	1 -	2 -	3 -	4 -	5
13)英語を学ぶ事は本当に楽しい	1 -	2 -	3 -	4 -	5
14)外国の人とコミュニケーションをはかるために英語を使いたい	1 -	2 -	3 -	4 -	5
15)将来のことを考えると英語を使うことは重要だと					

思う	1 - 2 - 3 - 4 - 5
16)英語を学ぶ事は本当にすばらしいことだと思う	1 - 2 - 3 - 4 - 5
17)私が英語を学んでも学ばなくてもあまり気にする人はいない。	1 - 2 - 3 - 4 - 5
18) 英語を習得することは自分にとってむずかしい	1 - 2 - 3 - 4 - 5
19)外国人の友達と英語で話しているのをよく思いうかべる	1 - 2 - 3 - 4 - 5
20)英語ができればもっと教養のある人になれる。	1 - 2 - 3 - 4 - 5

2. 自分が英語を学習する理由はなぜだと思いますか？また、英語を学習することについてどう考えていますか？下記の質問に対して、1から5の最も当てはまる所に○をしてください。

1	2	3	4	5
全く思わない		どちらでもない		強くそう思う

1) 授業から何を得ているのか、よくわからない。	1 - 2 - 3 - 4 - 5
2) 英語を勉強するのは楽しいから。	1 - 2 - 3 - 4 - 5
3) 教師に自分はよい生徒だと思われたいから。	1 - 2 - 3 - 4 - 5
4) 将来使えるような英語の技能を身につけたいから。	1 - 2 - 3 - 4 - 5
5) 自分にとって必要なことだから。	1 - 2 - 3 - 4 - 5
6) よい成績を取りたいと思うから。	1 - 2 - 3 - 4 - 5
7) 英語は勉強しても、成果が上がらないような気がする。	1 - 2 - 3 - 4 - 5
8) 英語を勉強しておかないと、あとで後悔すると思うから。	1 - 2 - 3 - 4 - 5
9) 英語の勉強は興味をそそるから。	1 - 2 - 3 - 4 - 5
10) 英語を勉強する理由をわかろうとは思わない。	1 - 2 - 3 - 4 - 5
11) 英語くらいできるのは、普通だと思うから。	1 - 2 - 3 - 4 - 5
12) 英語の授業が楽しいから。	1 - 2 - 3 - 4 - 5
13) 英語を勉強するのは、決まりのようなものだから。	1 - 2 - 3 - 4 - 5
14) 英語を身につけることは重要だと思うから。	1 - 2 - 3 - 4 - 5
15) 英語の知識が増えるのは楽しいから。	1 - 2 - 3 - 4 - 5
16) 英語で会話ができると、何となく恰好がよいから。	1 - 2 - 3 - 4 - 5
17) 周りの大人にうるさく言われるから。	1 - 2 - 3 - 4 - 5

18) 英語学習は時間を無駄にしているような気がする。	1 - 2 - 3 - 4 - 5
19) 外国語を少なくともひとつは話せるようになりたいから。	1 - 2 - 3 - 4 - 5
20) 英語を勉強して新しい発見があると嬉しいから。	1 - 2 - 3 - 4 - 5
21) 英語を勉強しなければ、気まずいと思うから。	1 - 2 - 3 - 4 - 5
22) 英検などの資格を取りたいから。	1 - 2 - 3 - 4 - 5
23) 英語の何を勉強しているのか、よくわからない。	1 - 2 - 3 - 4 - 5
24) 自分の成長にとって役立つと思うから。	1 - 2 - 3 - 4 - 5
25) 英語を勉強しなければならない社会だから。	1 - 2 - 3 - 4 - 5

3. あなたは専門教科の学習についてどのような意識を持っていますか。次に示す項目について、どれぐらい自分に当てはまるか考え、完全にあてはまる場合は５に、全く当てはまらない場合は１を、あるいはその中間で、最もあなたの気持をよく表わすところに○をしてください。

専門教科に関する意識	全くあてはまらない 全く違う				完全にあてはまる そのとおりだ
1) 専門の勉強をすることはとても面白い。	1 -	2 -	3 -	4 -	5
2) 理工学部で勉強したからには、専門性を生かした就職をしなくてはいけない。	1 -	2 -	3 -	4 -	5
3) 課題やレポートの評価を受け取る時はいつも緊張する。	1 -	2 -	3 -	4 -	5
4) 将来、工学者として仕事（研究）している自分をよく想像する。	1 -	2 -	3 -	4 -	5
5) 自分は専門教科の勉強には自信がある。	1 -	2 -	3 -	4 -	5
6) 自分が今の学科と関係のない仕事に就いたら、周囲はがっかりすると思う。	1 -	2 -	3 -	4 -	5
7) 専門教科の授業中、自分が理解していないと周りが思わないかと不安になる。	1 -	2 -	3 -	4 -	5
8) 専門教科の勉強は楽しい。	1 -	2 -	3 -	4 -	5
9) 自分の夢を実現するためには、今の学科の勉強は必要である。	1 -	2 -	3 -	4 -	5
10) 自分が将来就きたい仕事がある。	1 -	2 -	3 -	4 -	5
11) 専門教科のレポートや課題はいつも良い出来だと思う。	1 -	2 -	3 -	4 -	5
12) 楽しみな専門教科がある。	1 -	2 -	3 -	4 -	5

13) 理工学部を卒業したからといって、工学者になる必要はない。 1 - 2 - 3 - 4 - 5

14) 大学卒業後の希望進路がはっきりしている。 1 - 2 - 3 - 4 - 5

15) 専門教科の学習はとても難しい。 1 - 2 - 3 - 4 - 5

16) 専門を生かして働いている姿をよく思い浮かべる。 1 - 2 - 3 - 4 - 5

17) 良い仕事に就くためには専門の勉強をしっかりとしなくてはいけない。 1 - 2 - 3 - 4 - 5

18) 専門教科は努力すれば必ず理解できる。 1 - 2 - 3 - 4 - 5

19) 自分が専門と関係ない仕事をしても構わない。 1 - 2 - 3 - 4 - 5

20) 専門授業を受けていると周りが自分よりも理解していると思う。 1 - 2 - 3 - 4 - 5

1) 所属学科に○をしてください。

[機械創造工学科 経営システム工学科 情報テクノロジー学科]

2) 性別を○で囲んでください。[女性 男性]

ご協力ありがとうございました。

English translations of questionnaire items for Study 1

1. English learning motivational/attitudinal questionnaire

1 Whenever I think of my future career, I imagine myself being able to use English. (IL2S)
2 I find learning English is really interesting. (ATLE)
3 I get nervous and confused when I am speaking in my English class. (ECA)
4 For me to become an educated person I should learn English. (OL2S)
5 For people where I live, learning English doesn't really matter that much.*(OL2S)
6 I'm always looking forward to my English classes. (ATLE)
7 I often imagine myself as someone who is able to speak English. (IL2S)
8 If I made the effort, I could learn a foreign language. (LSC)
9 When I think about my future, it is important that I use English. (IL2S)
10 I always feel that my classmates speak English better than I do. (ECA)
11 Learning English is necessary because it is an international language. (OL2S)
12 I am sure I will be able to learn a foreign language. (LSC)
13 I really enjoy learning English. (ATLE)
14 I would like to be able to use English to communicate with people from other countries. (IL2S)
15 The things I want to do in the future require me to speak English. (IL2S)
16 Learning English is really great. (ATLE)
17 Hardly anybody really cares whether I learn English or not. *(OL2S)
18 Learning a foreign language is a difficult task for me. *(LSC)
19 I can imagine speaking English with international friends. (IL2S)
20 Knowledge of English would make me a better educated person. (OL2S)

Note. *Reverse items. IL2S = ideal L2 self; OL2S = ought-to L2 self; ATLE = attitudes towards learning English; LSC = linguistic self-confidence.

2. English learning motivational regulations

1 I do not know what value there is in learning English. (Amotivation)
2 Studying English is fun. (Intrinsic)
3 I want my teacher to think of me as a good student. (Introjected)
4 I want to acquire English skills for use in the future. (Identified)
5 It is important for me to become able to use English. (Identified)
6 I want to get a good grade. (External)
7 I feel I cannot get good results even if I studied English hard. (Amotivation)
8 I would feel guilty if I did not study English. (Introjected)
9 Studying English interests me. (Intrinsic)
10 I do not want to know why I must study English. (Amotivation)
11 It is normal to be able to use English. (Introjected)
12 English class is fun. (Intrinsic)
13 It is expected that one study English. (External)
14 It is important to have English skills. (Identified)
15 Because it is enjoyable to increase my knowledge of English. (Intrinsic)
16 It may be cool if I can speak English. (Introjected)
17 Parents and teachers nag me to study English. (External)
18 I feel that studying English is a waste of time. (Amotivation)
19 I want to be able to speak at least one foreign language. (Identified)
20 It is rewarding when I make new discoveries by studying English. (Intrinsic)
21 I may regret it later if I do not study English now. (Introjected)
22 I want to get a certificate like STEP and TOEIC. (External)
23 I do not understand why I have to study English. (Amotivation)
24 I think it is good for my personal development. (Identified)
25 One has to study English in this society. (External)

3. Motivations and attitudes towards studying one's specialization

1 My specialization is interesting.
2 I should seek employment that makes use of my specialization.
3 I get nervous when my coursework is graded.
4 I often imagine myself working (researching) as an engineer.
5 I am confident in studying my specialization.
6 If I accept a job unrelated to my specialization, those close to me will be disappointed.
7 In classes pertaining to my major, I get nervous if my classmates consider that I do not understand the content.
8 I enjoy studying my specialization.
9 The things I want to do in the future require me to study subjects in my major.
10 There is a specific occupation I want to pursue.
11 I always get good grades in papers and assignments of my specialization.
12 There are topics in my specialization that I enjoy.
13 Obtaining an engineering degree does not mean that I must become an engineer.
14 My plans following graduation are certain.
15 I find subjects within my specialization difficult.
16 I believe I will utilize knowledge of my specialization.
17 To get a good job, I must focus on my specialization.
18 If I made the effort, I could understand subjects within my specialization.
19 It is not mandatory to find employment involving my specialization.
20 In classes pertaining to my major, other students seem to grasp the material more easily than me.

Appendix B: Questionnaire for Study 2

技術英語履修者の英語に対する意識調査

このアンケートは、皆さんが英語に対してどのような意識を持っているかを調査するためのものです。研究以外の目的に使われることはなく、成績には一切関係ありません。また、個人情報は必ず守る事をお約束します。尚、学生番号を書いて頂く欄がありますが、個人を特定するためではなくデータ ID として使用する為です。成績や発表時に使用するものではありません。正直に思う通り答えてください。ご協力よろしくお願い申し上げます。

1　あなたは英語に対してどのような意識を持っていますか。次に示す項目について、どれぐらい自分に当てはまるか考えて、完全にあてはまる場合は７に、全く当てはまらない場合は１を、あるいはその中間で、最もあなたの気持ちをよく表すところに○をしてください。

英語に対する意識変化	全く自分にはあてはまらない 全く違う						完全にあてはまる そのとおりだ
例)　英語は簡単である	1	③	3	4	5	6	7
1)将来英語を使って仕事をしている自分をよく想像する	1	2	3	4	5	6	7
2)英語を勉強するのはとても面白い	1	2	3	4	5	6	7
3)英語の授業で発言していると緊張する	1	2	3	4	5	6	7
4)教養を身につけるために英語を習得するべきだ。	1	2	3	4	5	6	7
5)今の私の環境では英語がそんなにできなくてもかまわない	1	2	3	4	5	6	7
6)いつも英語の授業を楽しみにしている	1	2	3	4	5	6	7
7)英語を話せるようになっている自分をよく想像する	1	2	3	4	5	6	7
8)努力すれば、必ず英語ができるようになる	1	2	3	4	5	6	7
9)将来のやりたいことのためには英語を話す事が必要である	1	2	3	4	5	6	7
10)クラスメートは自分より英語がうまく話せるような気がする	1	2	3	4	5	6	7
11)英語は国際共通語なので勉強する必要がある。	1	2	3	4	5	6	7
12)自分は英語の習得には自信がある	1	2	3	4	5	6	7
13)英語を学ぶ事は本当に楽しい	1	2	3	4	5	6	7

14)外国の人とコミュニケーションをはかるために英語を使いたい　1- 2- 3- 4- 5- 6- 7

15)将来のことを考えると英語を使うことは重要だと思う　1- 2- 3- 4- 5- 6- 7

16)英語を学ぶ事は本当にすばらしいことだと思う　1- 2- 3- 4- 5- 6- 7

17)私が英語を学んでも学ばなくてもあまり気にする人はいない。　1- 2- 3- 4- 5- 6- 7

18) 英語を習得することは自分にとってむずかしい　1- 2- 3- 4- 5- 6- 7

19)外国人の友達と英語で話しているのをよく思いうかべる　1- 2- 3- 4- 5- 6- 7

20)英語ができればもっと教養のある人になれる。　1- 2- 3- 4- 5- 6- 7

2　あなたは、自分の英語力をどのように評価していますか。次に示す項目において、あなた自身の英語力を考え、下記を参考に最も自分にあてはまると思うところにそれぞれ○をしてください。

1	2	3	4
全くできない	できない	できる	よくできる

例)英語をネイティブスピーカーのように使う　○ - 2 - 3 - 4

1)英語で自分が言いたい事を表現する　1 - 2 - 3 - 4

2)英文資料を読解する　1 - 2 - 3 - 4

3)辞書や参考書を使って自分の英語を検証する　1 - 2 - 3 - 4

4)英語で発表する　1 - 2 - 3 - 4

5)簡単な会話を英語でする　1 - 2 - 3 - 4

6)必要な英文資料を作成する　1 - 2 - 3 - 4

7)英文を作る際に適切な言葉を選ぶ　1 - 2 - 3 - 4

8)文法や品詞の違いが分かる　1 - 2 - 3 - 4

9)誰にでも通じる発音で話す　1 - 2 - 3 - 4

10)自ら必要な情報を調べて発表する　1 - 2 - 3 - 4

11)話し言葉と書き言葉の違いが分かる　1 - 2 - 3 - 4

12)誰にでも分かる表現ができる　1 - 2 - 3 - 4

13)英語で言われた事が分かる　　1 - 2 - 3 - 4

14)ネイティブスピーカーのスピーチを聞き取る　　1 - 2 - 3 - 4

学生番号 15＿＿＿＿＿＿＿＿　性別 [男 ・ 女] (○をして下さい)

ご協力本当にありがとうございました。

English translations of questionnaire items for Study 2

1. English learning motivational/attitudinal questionnaire (items are the same as Appendix A-1)

2. Perceived competence

1 I can express what I want to say in English. (PE)
2 I can understand English documents. (RC)
3 I can check my English writing using a dictionary and textbooks. (EWS)
4 I can give a presentation in English. (PE)
5 I can have a simple conversation in English. (DCS)
6 I can write English materials for a presentation. (EWS)
7 I can choose appropriate vocabulary when writing English. (EWS)
8 I know grammatical rules and different parts of speech. (EWS)
9 I can speak English with the knowledge of correct pronunciation. (PE)
10 I can research necessary information and present the results. (PE)
11 I can see the difference between written and spoken English. (PE)
12 I can make myself understood by everyone. (PE)
13 I can understand what is spoken in English. (DCS)
14 I can understand what native English speakers say. (DCS)

Note. EWS = English writing skills; PES = presentation and explanation skills; DCS = daily conversation skills; RC = reading comprehension (deleted this time).

Appendix C: Questionnaire for Study 3

技術英語履修者の英語に対する意識調査

このアンケートは、皆さんが英語に対してどのような意識を持っているかを調査するためのものです。研究以外の目的に使われることはなく、成績には一切関係ありません。また、個人情報は必ず守る事をお約束します。尚、学生番号を書いて頂く欄がありますが、個人を特定するためではなくデータ ID として使用する為です。成績や発表時に使用するものではありません。正直に思う通り答えてください。ご協力よろしくお願い申し上げます。

1　あなたは英語に対してどのような意識を持っていますか。次に示す項目について、どれぐらい自分に当てはまるか考えて、完全にあてはまる場合は７に、全く当てはまらない場合は１を、あるいはその中間で、最もあなたの気持ちをよく表すところに○をしてください。

英語に対する意識変化	全く自分にはあてはまらない 全く違う						完全にあてはまる そのとおりだ
例)　英語は簡単である	1	③	3	4	5	6	7
1)将来英語を使って仕事をしている自分をよく想像する	1	2	3	4	5	6	7
2)英語の授業で発言していると緊張する	1	2	3	4	5	6	7
3)教養を身につけるために英語を習得するべきだ。	1	2	3	4	5	6	7
4)今の私の環境では英語がそんなにできなくてもかまわない	1	2	3	4	5	6	7
5)英語を話せるようになっている自分をよく想像する	1	2	3	4	5	6	7
6)努力すれば、必ず英語ができるようになる	1	2	3	4	5	6	7
7)将来のやりたいことのためには英語を話す事が必要である	1	2	3	4	5	6	7
8)クラスメートは自分より英語がうまく話せるような気がする	1	2	3	4	5	6	7
9)英語は国際共通語なので勉強する必要がある。	1	2	3	4	5	6	7
10)自分は英語の習得には自信がある	1	2	3	4	5	6	7
11)外国の人とコミュニケーションをはかるために英語を使いたい	1	2	3	4	5	6	7
12)将来のことを考えると英語を使うことは重要だと思う	1	2	3	4	5	6	7

13)私が英語を学んでも学ばなくてもあまり気にする人はいない。 1- 2- 3- 4- 5- 6- 7

14)英語を話せる人が自分の英語を聞くと変に思うのではないかと心配である。 1- 2- 3- 4- 5- 6- 7

15) 英語を習得することは自分にとってむずかしい 1- 2- 3- 4- 5- 6- 7

16)外国人の友達と英語で話しているのをよく思いうかべる 1- 2- 3- 4- 5- 6- 7

17)英語ができればもっと教養のある人になれる。 1- 2- 3- 4- 5- 6- 7

18)自分が英語を学ぶ努力をしなかったら周囲の人はがっかりすると思う。 1- 2- 3- 4- 5- 6- 7

19)英語が母語の人と話す時には不安を感じる。 1- 2- 3- 4- 5- 6- 7

20)英語を話す人と会う時にはドキドキする。 1- 2- 3- 4- 5- 6- 7

2 あなたは、自分の英語力をどのように評価していますか。次に示す項目において、あなた自身の英語力を考え、下記を参考に最も自分にあてはまると思うところにそれぞれ○をしてください。

1	2	3	4
全くできない	できない	できる	よくできる

例)英語をネイティブスピーカーのように使う ○ - 2 - 3 - 4

1)英語で自分が言いたい事を表現する 1 - 2 - 3 - 4

2)英文資料を読解する 1 - 2 - 3 - 4

3)辞書や参考書を使って自分の英語を検証する 1 - 2 - 3 - 4

4)英語で発表する 1 - 2 - 3 - 4

5)簡単な会話を英語でする 1 - 2 - 3 - 4

6)必要な英文資料を作成する 1 - 2 - 3 - 4

7)英文を作る際に適切な言葉を選ぶ 1 - 2 - 3 - 4

8)文法や品詞の違いが分かる 1 - 2 - 3 - 4

9)誰にでも通じる発音で話す 1 - 2 - 3 - 4

10)自ら必要な情報を調べて発表する 1 - 2 - 3 - 4

11)話し言葉と書き言葉の違いが分かる 1 - 2 - 3 - 4

12)誰にでも分かる表現ができる　　1 - 2 - 3 - 4

13)英語で言われた事が分かる　　1 - 2 - 3 - 4

14)ネイティブスピーカーのスピーチを聞き取る　　1 - 2 - 3 - 4

3　今までに受けてきた英語授業はどのようなものだったと思いますか。下記の質問に対して、1から5の最もあてはまる所に○をして下さい。

1	------	2	------	3	------	4	------	5
全く思わない				どちらでもない				強くそう思う

1. 英語の授業で勉強することは、すべて教師が決めている。

1	------	2	------	3	------	4	------	5

2. 英語の授業では、よい成績が取れると思う。

1	------	2	------	3	------	4	------	5

3. 英語が出来ないと思う事がよくある。

1	------	2	------	3	------	4	------	5

4. 英語の授業では、達成感を味わうことができる。

1	------	2	------	3	------	4	------	5

5. 英語の授業の課題内容には、選択の自由が与えられている。

1	------	2	------	3	------	4	------	5

6. 英語の授業での自分の頑張りに満足している。

1	------	2	------	3	------	4	------	5

7. 英語の授業では、友達と協力して勉強できていると思う。

1	------	2	------	3	------	4	------	5

8. 英語の授業では、友達同士で学びあう雰囲気があると思う。

1	------	2	------	3	------	4	------	5

9. 授業でのグループ活動には、協力的に取り組めていると思う。

1	------	2	------	3	------	4	------	5

10. 英語の授業には、和気あいあいとした雰囲気がないと思う。

1	------	2	------	3	------	4	------	5

11. 教師は英語の授業の進め方などを相談してくれる。

1	------	2	------	3	------	4	------	5

12. 英語の授業でどんなことが勉強したいか、述べる機会がある。

1 ------ 2 ------ 3 ------ 4 ------ 5

13. 英語を学ぶにあたって、私の意見は重要視されている。

1 ------ 2 ------ 3 ------ 4 ------ 5

14. 英語の授業を受けるとき、プレッシャーを感じる。

1 ------ 2 ------ 3 ------ 4 ------ 5

15. 英語の授業では、教師や友達から褒められることがある。

1 ------ 2 ------ 3 ------ 4 ------ 5

16. 英語の勉強はやれば出来ると感じている。

1 ------ 2 ------ 3 ------ 4 ------ 5

17. 英語の授業を一緒に受けている友達とは、仲がよいと思う。

1 ------ 2 ------ 3 ------ 4 ------ 5

18. 英語の授業を受けている友達は、「本当の友達」だと思う。

1 ------ 2 ------ 3 ------ 4 ------ 5

4　自分が英語を学習する理由はなぜだと思いますか？また、英語を学習することについてどう考えていますか？下記の質問に対して、1から5の最も当てはまる所に○をして下さい。

1	2	3	4	5
全く思わない		どちらでもない		強くそう思う

1.	英語を勉強するのは楽しいから。	1 … 2 … 3 … 4 … 5
2.	よい成績を取りたいと思うから。	1 … 2 … 3 … 4 … 5
3.	周りの大人にうるさく言われるから。	1 … 2 … 3 … 4 … 5
4.	英検やTOEICなどの資格を取りたいから。	1 … 2 … 3 … 4 … 5
5.	英語を勉強しなければならない社会だから。	1 … 2 … 3 … 4 … 5
6.	教師に自分はよい生徒だと思われたいから。	1 … 2 … 3 … 4 … 5
7.	英語を勉強しておかないと、あとで後悔すると思うから。	1 … 2 … 3 … 4 … 5
8.	英語で会話ができると、何となく恰好がよいから。	1 … 2 … 3 … 4 … 5
9.	英語くらいできるのは、普通だと思うから。	1 … 2 … 3 … 4 … 5
10.	英語は勉強しても、成果が上がらないような気がする。	1 … 2 … 3 … 4 … 5

11. 英語の何を勉強しているのか、よくわからない。	1 … 2 … 3 … 4 … 5
12. 英語を勉強する理由をわかろうとは思わない。	1 … 2 … 3 … 4 … 5
13. 時間を無駄にしているような気がする。	1 … 2 … 3 … 4 … 5
14. 将来使えるような英語の技能を身につけたいから。	1 … 2 … 3 … 4 … 5
15. 英語を身につけることは重要だと思うから。	1 … 2 … 3 … 4 … 5
16. 外国語を少なくともひとつは話せるようになりたいから。	1 … 2 … 3 … 4 … 5
17. 自分の成長にとって役立つと思うから。	1 … 2 … 3 … 4 … 5
18. 英語を勉強して新しい発見があると嬉しいから。	1 … 2 … 3 … 4 … 5
19. 英語の知識が増えるのは楽しいから。	1 … 2 … 3 … 4 … 5
20. 英語の授業が楽しいから。	1 … 2 … 3 … 4 … 5
21. 自分にとって必要なことだから。	1 … 2 … 3 … 4 … 5
22. 英語を勉強しなければ、気まずいと思うから。	1 … 2 … 3 … 4 … 5
23. 英語を勉強するのは、決まりのようなものだから。	1 … 2 … 3 … 4 … 5
24. 授業から何を得ているのか、よくわからない。	1 … 2 … 3 … 4 … 5

学生番号 15＿＿＿＿＿＿＿

ご協力本当にありがとうございました。

English translations of questionnaire items for Study 3

1. English learning motivational/attitudinal questionnaire

1 Whenever I think of my future career, I imagine myself being able to use English. (IL2S)
2 I get nervous and confused when I am speaking in my English class. (ECA)
3 For me to become an educated person I should learn English. (OL2S)
4 For people where I live learning English doesn't really matter that much. (OL2S)
5 I often imagine myself as someone who is able to speak English. (IL2S)
6 If I made the effort, I could learn a foreign language. (LSC)
7 The things I want to do in the future require me to speak English. (IL2S)
8 I always feel that my classmates speak English better than I do. (ECA)
9 Learning English is necessary because it is an international language. (OL2S)
10 I am sure I will be able to learn a foreign language. (LSC)
11 I would like to be able to use English to communicate with people from other countries. (IL2S)
12 When I think about my future, it is important that I use English. (IL2S)
13 Hardly anybody really cares whether I learn English or not. (OL2S)
14 I am worried that other speakers of English would find my English strange. (EUA)
15 Learning a foreign language is a difficult task for me. *(LSC)
16 I can imagine speaking English with international friends. (IL2S)

17 A knowledge of English would make me a better educated person. (OL2S)
18 If I don't try to learn English I'll be letting someone else down. (OL2S)
19 I would feel uneasy speaking English with a native speaker. (EUA)
20 If I met an English speaker, I would feel nervous. (EUA)

Note. *Reverse items. IL2S = ideal L2 self; OL2S = ought-to L2 self; LSC = linguistic self-confidence; ECA = English classroom anxiety; EUA = English use anxiety.

2. Perceived competence (items are the same as Appendix B-2)

3. Three psychological needs related to learning English

1 My teacher always decides what to study in the English/Technical English course. *(Autonomy)
2 I think I will get good grades in the English/Technical English class. (Competence)
3 I sometimes feel that I am not good at English. *(Competence)
4 I feel a sense of accomplishment in the English/Technical English class. (Competence)
5 I can choose between several homework tasks in English/Technical English classes. (Autonomy)
6 I am satisfied with my performance in the English/Technical English class. (Competence)
7 I think I can study English collaboratively with my classmates. (Relatedness)
8 There is an atmosphere of collaborative learning with classmates in the English/Technical English class. (Relatedness)
9 I think I am studying collaboratively in group by working with my classmates. (Relatedness)
10 I do not think there is a friendly atmosphere in the English/Technical English class. *(Relatedness)
11 (My) Teacher asks for the opinions of students about the content and/or procedure of the class. (Autonomy)
12 The opinions of students are taken into consideration in the English/Technical English class. (Autonomy)
13 My opinions are valued in learning English/Technical English. (Autonomy)
14 I have feel pressures when attending the English/Technical English class. *(Autonomy)
15 I am sometimes encouraged by my friends and teacher during the English/Technical English class. (Competence)
16 I think I will succeed in this English/Technical English class if I try hard. (Competence)
17 I get along with my classmates in the English/Technical English class. (Relatedness)
18 For me classmates in the English/Technical English class are my "true friends." (Relatedness)

Note. *Reverse items

4. English learning motivational regulations

1 Studying English is fun. (Intrinsic)
2 I want to get a good grade. (External)
3 Parents and teachers nag me to study English. (External)
4 I want to get a certificate like STEP and TOEIC. (External)
5 One has to study English in this society. (External)
6 I want my teacher to think of me as a good student. (Introjected)
7 I would feel guilty if I did not study English. (Introjected)
8 It may be cool if I can speak English. (Introjected)

9 It is normal to be able to use English. (Introjected)
10 I feel I cannot get good results even if I studied English hard. (Amotivation)
11 I do not know what value there is in learning English. (Amotivation)
12 I do not want to know why I must study English. (Amotivation)
13 I feel that studying English is a waste of time. (Amotivation)
14 I want to acquire English skills for use in the future. (Identified)
15 It is important to have English skills. (Identified)
16 I want to be able to speak at least one foreign language. (Identified)
17 I think it is good for my personal development. (Identified)
18 It is rewarding when I make new discoveries by studying English. (Intrinsic)
19 Because it is enjoyable to increase my knowledge of English. (Intrinsic)
20 English class is fun. (Intrinsic)
21 It is important for me to become able to use English. (Identified)
22 I may regret it later if I do not study English now. (Introjected)
23 It is expected that one study English. (External)
24 I do not understand why I have to study English. (Amotivation)

Appendix D: Learning self-record sheet for Study 4

1. Learning self-record sheet submitted in May.

技術英語Ⅰ　個人学習記録（第一回プレゼンテーション）

学生番号＿＿＿＿＿＿＿＿＿＿　名前＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

Theme: Physical message と summarize

プレゼンテーションに向けての目標

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プレゼンテーション準備で実際に行った事：各項目について○を入れましょう。

	教科書の英文を理解する。
	自分の言葉で表現する。
具体例：	
	アクセント位置や発音を調べる。
具体例：	
	台本に読み易いようなマークをつける。
	読む練習をする。（計　　回）
	自分の声を録音してチェックする。（計　　回）
	なるべく暗記する。

プレゼンテーション本番で心がけた事：心がけた場合は、□を■に変え、自分の出来に合う方の文字を太字にしましょう。

□　大きな声を出す
（出来た　　あまり出来なかった）

□　周囲を見る
（出来た　　あまり出来なかった）

□　姿勢や立ち方
（出来た　　あまり出来なかった）

□　アクセントや発音
（出来た　　あまり出来なかった）

本番を終えた感想：

ビデオで自分を見た感想：

反省点と解決策：

次回プレゼンテーションの目標：

自己評価：今回の発表に向けた自分の姿勢を５段階で評価し、最も良い場合は、５を出来なかったと思う場合は１をそれぞれ太字にしましょう。

英語の準備は十分だった。　1-2-3-4-5　練習はしっかり出来た。　1-2-3-4-5

内容についてきちんと調べた。　1-2-3-4-5　次回はもっと頑張りたい。　1-2-3-4-5

2. Learning self-record sheet submitted in July

技術英語Ⅰ　個人学習記録（第二回プレゼンテーション）

学生番号＿＿＿＿＿＿＿＿　名前＿＿＿＿＿＿＿＿＿＿＿＿

Theme: Research と Organize

プレゼンテーションに向けての目標

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プレゼンテーション準備で実際に行った事：各項目について○を入れましょう。

	トピックの内容をより深く調べる。
	インターネットや雑誌を使って調べる。 具体例：
	本や教科書を参照する。 具体例：
	構成を理解し易いように組みなおす。
	自分の言葉で表現する。

その他

プレゼンテーション本番で心がけた事：心がけた場合は、□を■に変え、自分の出来に合う方の文字を太字にしましょう。

□　大きな声を出す
（出来た　　あまり出来なかった）

□　周囲を見る
（出来た　　あまり出来なかった）

□　姿勢や立ち方
（出来た　　あまり出来なかった）

□　アクセントや発音
（出来た　　あまり出来なかった）

本番を終えた感想（前回と比較して）：

反省点と解決策：

次回プレゼンテーションの目標：

自己評価：今回の発表に向けた自分の姿勢を５段階で評価し、最も良い場合は、５を出来なかったと思う場合は１をそれぞれ太字にしましょう。

英語の準備は十分だった。　1-2-3-4-5　練習はしっかり出来た。　1-2-3-4-5

内容についてきちんと調べた。　1-2-3-4-5　次回はもっと頑張りたい。　1-2-3-4-5

3. Learning self-record sheet submitted in November

技術英語　個人学習記録（第三回プレゼンテーション）

学生番号＿＿＿＿＿＿＿＿＿＿　名前＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

Theme: Business Presentation, Target & Audience

プレゼンテーションに向けての目標

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プレゼンテーション準備で実際に行った事：各項目について○を入れましょう。

	オーディエンスを決定する。 Audience:
	自分のテーマを理解する。
	オーディエンスに合った構成を考える。
	説得力のあるデータを集める。
その他	

プレゼンテーション本番で心がけた事：心がけた場合は、□を■に変え、自分の出来に合う方の文字を太字にしましょう。

□　大きな声を出す
（出来た　　あまり出来なかった）

□　周囲を見る
（出来た　　あまり出来なかった）

□　姿勢や立ち方
（出来た　　あまり出来なかった）

□　アクセントや発音
（出来た　　あまり出来なかった）

本番を終えた感想（良くなった所）：

反省点と解決策：

次回プレゼンテーションの目標：

自己評価：今回の発表に向けた自分の姿勢を５段階で評価し、最も良い場合は、５を出来なかったと思う場合は１をそれぞれ太字にしましょう。

英語の準備は十分だった。　1-2-3-4-5　練習はしっかり出来た。　1-2-3-4-5

内容についてきちんと調べた。　1-2-3-4-5　次回はもっと頑張りたい。　1-2-3-4-5

4. Learning self-record sheet submitted in December

技術英語 I　個人学習記録（第四回プレゼンテーション）

学生番号＿＿＿＿＿＿＿＿＿＿　名前＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

Theme: Business presentation

プレゼンテーションに向けての目標

・

・

プレゼンテーション準備で行った事：

□

□

□

□

□

□

プレゼンテーション本番で心がけた事：心がけた場合は、□を塗りつぶし、自分の出来に当てはまる方を○で囲みましょう。

□　大きな声を出す
（出来た　あまり出来なかった）

□　周囲を見る
（出来た　あまり出来なかった）

□　姿勢や立ち方
（出来た　あまり出来なかった）

□　アクセントや発音
（出来た　あまり出来なかった）

本番を終えた感想：

一年間の自分の成長、自己評価：

自己評価：
今回の発表に向けた自分の姿勢を 5 段階で評価し、最も当てはまる数字を○で囲みましょう。

英語の準備は十分だった。　1-2-3-4-5
練習はしっかり出来た。　1-2-3-4-5
内容についてきちんと調べた。1-2-3-4-5
もっと頑張れば良かった。　1-2-3-4-5

ビデオの自分を見た感想、反省点：