Examining the Motivational Effect of Presentation-Based Instruction on Japanese Engineering Students – From the Viewpoints of the Ideal Self and Self-Determination Theory –

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Abstract

Although English is frequently considered a necessary tool for engineers, engineering students have been shown to lack motivation when learning English. The present study used the L2 motivational self-system of Dörnyei (2009) and the self-determination theory of Deci and Ryan (2000) to examine the ways in which a group of engineering students was motivated to learn English, and the effect of a presentation-based course on their motivation. The results showed that the participating students were highly motivated to learn English, although their motivation was rather extrinsic or instrumental. However, they were anxious about using English and had little confidence in doing so. After the students completed a 1-year presentation-based English course, their perceived competence grew significantly, and they found English learning to be a more meaningful activity than they previously felt. The results also showed that compared to conventional English courses, the presentation-based course satisfied three psychological needs in the students. Thus, we concluded that the presentation activities were effective in motivating engineering students to learn English.

Keywords: motivation, ideal L2 self, self-determination theory, presentation-based instruction

1. Introduction

"Mathematics, English, and computers are necessary tools for engineers." This is a phrase that engineering professors repeatedly used when the first author was an
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engineering student. In this rapidly globalizing world, engineers are required to go out into the international community (Noguchi, 2009); therefore, English has become crucial as a communication tool for these professionals. A number of studies have described effective and practical English educational approaches for teaching this language to engineering students (e.g., Miyama, 2000; Miyama & Nitta, 2003; Yamauchi, 2005), and many colleges and universities have started offering courses in technical or scientific English. The lack of interest and enthusiasm that engineering students have shown in learning English was always given as one of the reasons why these technical English courses began. In an interview-based survey that the first author conducted previously (Maekawa, in press), many engineering professors indicated that the low awareness of the necessity of learning English, and the lack of motivation towards learning English, shown by the engineering students were sources of concern, in addition to their lack of English knowledge, comprehension skills, and application skills. As described above, motivation has always been regarded as critical to the implementation of successful teaching of English for engineering students. In addition, motivation is vitally important in the learning of language, because it may direct an individual's choice to learn the language and sustain the persistence and effort of learning (Dörnyei, 2001; Gardner, 2010).

However, little research has been conducted on the opinions of engineering students of learning English, or on the kind of class that would motivate them to learn this language. As Watanabe (2009) discussed, an English class that would directly be related to the future career and professional field of the students would be ideal. However, with the exception of a few universities, it may be difficult to design an English course specifically for undergraduate engineering students that would teach the language skills necessary for their future career, since their working environments would obviously vary. Therefore, it appears important to provide a course that would both help students understand how and when they would need English in the future, and lead them to learn English more proactively. In a preliminary study (Maekawa & Yashima, 2012), we conducted a questionnaire survey based on the L2 motivational self system developed by Dörnyei (2005) to examine whether engineering students possess a self-image in which they use English in the future, and how presentation-based instruction would affect these future-self images. We found that the students who were surveyed understood the importance of learning English, but had little confidence in their ability to use it. The results also showed that they gained confidence in using English and overcame anxiety through a 1-year presentation-based
course. Therefore, we concluded that a course of this type is effective in motivating engineering students to learn English. On the basis of these results, we thought it necessary to identify the factors that influence the motivational change that occurs in students throughout the duration of a 1-year presentation-based course. In order to design and implement a study to assess the motivational development of the students, we will use self-determination theory (SDT), in addition to the L2 motivational self system.

SDT, developed by Deci and Ryan (2000), is a theory that concerns both psychological development and goal-directed behavior (Deci & Ryan, 2000). Using five different levels of motivational regulations, this theory considers how much individuals have internalized and self-determined an activity in which they participate. SDT also considers the relationships between human innate psychological needs and psychological well-being. Therefore, this theory would allow researchers to see the influence of the goal and learning situation of the learners on their motivation and learning process. Hence, in addition to the L2 motivational self system, we used SDT (Deci & Ryan, 2000; Ryan & Deci, 2002) as a theoretical framework in which to study the process by which a presentation-based course stimulates the level of motivation of engineering students, and the factors that affect this motivation.

2. Motivation Theory

2.1 The L2 Motivational Self System: Ideal L2 Self and Ought-to L2 Self

The concepts of the “ideal self” and “ought-to self” are included in a superordinate concept known as possible selves. According to Markus and Nurius (1986), possible selves are intimately connected to specific significant hopes, fears, and fantasies that are held by individuals. Unlike the other self-concepts, “possible selves are intrinsically future-oriented” (Carver, Reynolds, & Scheier, 1994, p. 134), and “possible selves 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 an individual, while ought-to self is based on duty and obligations. These concepts work as self-regulatory functions 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 the self-regulatory functions and motivational effects of the ideal self and the ought-to self (Dörnyei, 2005).
The L2 motivational self system consists of three components: ideal L2 self, ought-to L2 self, and L2 learning experience. Ideal L2 self refers to a positive image that individuals hold of themselves using English in the future, and is expected to motivate L2 learners because of their willingness to reduce the discrepancy between the actual and ideal selves. Conversely, ought-to L2 self is a more protective and instrumental motivator that encourages individuals to participate in learning because they want to try to avoid negative outcomes. The L2 learning experience concerns the influence of learning environment and immediate learning experience (Dörnyei, 2005). Although ideal L2 self and ought-to L2 self concern the goal of individual and imagined future end-states, the L2 learning experience concerns influences from the surroundings of the learners (Dörnyei, 2005).

The authors believed that the concepts of the ideal L2 self and the ought-to L2 self form an appropriate framework for the study of the motivation of engineering students to learn English. If engineering students possessed a clear image of using English in future business settings, they would include English as part of the equation when attempting to formulate their ideal self-image. They may then realize that to achieve that ideal image they need to understand the importance of English, and must therefore set a clearer goal and be motivated to learn this language. Thus, we decided to examine their motivation to learn English using the L2 motivational self system as a conceptual framework.

2.2 Self-Determination Theory of Deci and Ryan (2000)

While the concepts of ideal self and ought-to self are considered as future-regulating aspects, SDT postulates that human beings have natural tendencies to actively engage in either personal or interpersonal activities that interest them (Deci & Ryan, 2000). SDT assumes that humans possess innate tendencies to regulate their own behavior through interaction with the environment and the social world (Noels, 2009; Ryan & Deci, 2002), and would therefore be motivated when their three basic psychological needs, autonomy, competence, and relatedness, are satisfied. Autonomy refers to self-organization and self-regulation (Deci & Ryan, 2000). It is the willingness of individuals to autonomously participate in learning activity. Competence is the sense of confidence and effectiveness that a learner possesses. The need for competence would lead individuals to challenge activities that may maintain or develop their skills and capacities (Ryan & Deci, 2002). Relatedness is a feeling of connection to others. It reflects the sense of belonging that individuals feel with regard
to others and their community (Ryan & Deci, 2002).

In SDT, the terms “intrinsic” and “extrinsic” motivation are differentiated as follows: intrinsic motivation leads individuals to participate in an activity for pleasure and satisfaction (Noels, Clement, & Pelletier, 1999), while extrinsic motivation is defined by the degree to which much individuals internalize and self-determine an activity. The degrees of extrinsic motivation are differentiated by external, introjected, and identified regulations, which enable investigators to identify the process of internalization (Deci & Ryan, 2000), and to design educational approaches focusing on individual differences (Hiromori, 2006). SDT allows researchers to see the changing processes of internalizing self-determined behavior.

SDT has been applied in studies of language teaching by Noels (e.g., Noels, 2001; Noels et al., 1999; Noels, Pelletier, Clement, & Vallerand, 2000), and some Japanese researchers have conducted interventional studies (Hiromori, 2006; Nishida & Yashima, 2009; Tanaka & Hiromori, 2007), wherein motivational changes, produced through the use of project-based teaching, were assessed using SDT. These studies suggested that project-based instruction would affect the motivation of students to learn English when the instruction met the needs of students or was considered interesting. Our research, which considers a presentation-based course to be a type of project-based instruction, is conducted along these lines and examines the motivational changes that occur through presentation-based courses. In addition, Dörnyei (2009) hypothesized that ideal self was linked to more self-determined regulations, whereas ought-to self related to less internalized regulations. This study may provide evidence to support these suggestions.

3. Designing a Presentation-Based Class

The most practical activity wherein engineering students can imagine that English is used is presentation. Many English self-study books aimed at engineers (e.g., Campbell, 1995; Davis, 2005; Raman & Sharma, 2008) have introduced the fact that numerous opportunities exist to give a presentation in English, highlighting the importance of possessing the skill to communicate knowledge and information in this language. Therefore, the first author decided to assign the presentation by introducing engineering or machinery products in English as the central activity of a year-long technical English course, and expected that English presentation activities would enable students to imagine how they would use English in the future. Through the experience of an expected future English-using situation, students may envision a
clearer ideal self-image and goal to learn English, and may then be more motivated to learn this language.

When giving an English presentation, students are required to possess certain knowledge of the product, as well as the research skills to conduct an in-depth examination of the product, and the explanation skills to introduce it clearly and concisely. Therefore, making a presentation may encourage students to consider the kind of English skills they must acquire as engineers. Moreover, writing a script would provide training in English composition skills. Giving a speech in front of classmates compels students to be aware of pronunciation and prosody, whereas listening to the presentation of classmates develops listening comprehension skills. Conducting research and gathering information to prepare for the presentation can consequently help with reading comprehension skills.

In this technical English course, the students had four opportunities to give a 5-10-minute speech introducing an engineering or machinery product from their area of interest or discussing their dreams for a single academic year. The first author announced the presentation themes—product introduction, comparison with similar products, manual explanations, or business presentations—at least a month prior to the presentation date. The themes were carefully selected to ensure their increasing complexity. Class instruction was in accordance with these themes and provided the necessary information, vocabulary, and language structures to help students to prepare for the presentation by using a particular textbook: “Presenting Science” (Kiggell, Cleary, Hitomi, Yoshida, & Yubune, 2008). Therefore, the students were required to study and ensure that their speeches addressed their topics in a more in-depth manner, in the expectation that they would learn and acquire the necessary skills on a systematic basis. They were also required to submit a portfolio that contained the goals of each presentation, details of the work they had done in preparation for the presentation, and reflections of their actual performance after completion of each presentation. The students also evaluated and commented on the performance, content, and clarity of each of the presentations of their classmates. The results and comments were all typed up and returned to each presenter, along with the scores given by the instructor for performance, content, clarity, structure, and preparation. The presentation scripts were evaluated separately with regard to content, structure, vocabulary choices, language usage, and mechanics. As the instructor, the first author expected that this feedback would help students become aware of what kind of language they would need in the future, notice their strengths and weaknesses, and improve their performances.
In SDT, it is important to satisfy the three basic psychological needs of learners: autonomy, competence, and relatedness. Therefore, to do so, we took care to ensure that the following occurred: 1) although the stated theme was "mechanical product introduction," students were permitted to choose their presentation topic freely. We expected to satisfy their need of "autonomy" by allowing them to choose and research the topic of their interest. 2) Students gave presentations four times in a single academic year, so that they felt more accomplished and confident, as well as have a feeling of "competence." 3) They were permitted to give a presentation either individually, in a pair, or in a group of three. They therefore developed good relationships with their classmates, evaluating their presentations and giving comments or asking questions. There was also a Q&A session after each presentation. The students may feel "relatedness" through these peer-to-peer communications.

From the perspective of the L2 motivational self system, the authors expected that the students would develop a clear image of themselves using English, which, in turn, would influence their motivation towards learning this language. With regard to SDT, we also expected that the presentation-based course would satisfy the three psychological needs described above, and help the students to internalize the learning of English, and to become more self-determined in this task. With these expected motivational effects, the presentation-based class may lead students to actively participate in learning English. We then conducted the study as follows.

4. Methods
4.1 Purpose

The purpose of this study was to identify the motivational tendency of the engineering students towards using English, and to examine how a presentation-based course affected the way they felt about learning this language. Our research questions were as follows. 1) What kind of motivational and emotional effects does a presentation-based course have? 2) Can we identify groups who have different motivational profiles with different reactions to presentation-based teaching?

4.2 Participants

The participants were second- and third-year students in the mechanical engineering department of a private university in the Tokyo area of Japan, who were enrolled in the technical English I & II courses taught by the first author. The second-year students were in Technical English I (TEI), and the third-year students were in
Technical English II (TEII). Both TEI and TEII classes are elective, but meet the required English credits of the university.

4.3 Questionnaire

Questionnaire surveys were distributed in the first (April), the middle (July), and the last (January) classes of the academic years 2009 and 2010. In 2009, 46 students enrolled (33 in TEI and 9 in TEII); in 2010, 51 students enrolled (45 in TEI and 6 in TEII). An explanation of the purpose and intended use of the data was provided along with the questionnaire. Furthermore, the first author carefully explained the purpose of the research to the students, and informed them that they had the right to refuse participation, and that if they chose to participate, that they could ask for data to be subsequently removed. The 37 students who did not undertake all of the surveys were not considered, leaving a final total of 60 participants (22 in TEI and 9 in TEII in 2009, and 26 in TEI and 3 in TEII in 2010).

4.4 Materials

4.4.1 Motivational/attitudinal questionnaire (20 items, 7-point scale; S. Ryan, 2009)

On the basis of the studies and questionnaires of Dörnyei (2005), Yashima (2002), and other investigators, Ryan (2009) developed and adapted motivational scales to ensure suitability of use in Japan. Of the 100 items to measure 17 variables, we used 20 items to measure five variables. The five variables were the following: linguistic self-confidence (three items), English classroom anxiety (two items), English use anxiety (three items), ideal L2 self (six items), and ought-to L2 self (six items).

*Linguistic self-confidence.* Three items were used to reflect the confidence of individuals in learning English (e.g., “I am sure I will be able to learn a foreign language”).

*English classroom anxiety.* Two items were used to assess the extent of the anxiety individuals experienced when using English in the classroom (e.g., “I always feel that my classmates speak English better than I do”).

*English use anxiety.* Three items served to assess how anxious individuals were if using English with English speakers (e.g., “If I met an English speaker, I would feel nervous”).

*Ideal L2 self.* Six items were used to reflect how individuals visualize themselves as users of English in the future (e.g., “I often imagine myself as someone who is able
to speak English” and “I can imagine speaking English with international friends”).

*Ought-to L2 self.* Six items were used to reflect the extent to which individuals felt the need and the pressure to learn English (e.g., “For me to become an educated person I should learn English,” “Knowledge of English would make me a more educated person”).

### 4.4.2 Perceived competence (14 items, 4-point scale)

We composed an original can-do list specific to engineering students based on our former open-ended questionnaire survey, which asked what students wanted from, or thought was necessary to learn in, an English course, to determine how students perceived their English skills and knowledge. We also included important elements of technical communication, such as the three Cs (clear, correct, concise), when creating the can-do list.

### 4.4.3 To what degree psychological needs were fulfilled by SDT (18 items, 5-point scale; Hiromori, 2006)

The three categories and items are as follows.

*Autonomy:* Six items were used to assess the degree to which learners thought they had choices and freedom in English classes (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 in English that learners believed they could achieve (e.g., “I think I will get good grades in the English class”).

*Relatedness:* Six items served to assess how good the students perceived their relationships with their classmates to be (e.g., “I get along with my classmates in the English class”).

In the questionnaire that was administered first (in April of each academic year), we asked to what extent each psychological need was fulfilled by English classes in general. In the second and third questionnaires (administered in July and January of the academic years, respectively), the question was changed to ask to what degree the technical English class satisfied the psychological needs of the study participants. See Appendix A for a list of items used.

### 4.4.4 Motivational regulations (24 items, 5-point scale; Hiromori, 2006)

On the basis of studies and questionnaires conducted by Noels (e.g., Noels, 2001;
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Noels et al., 2000), Hiromori (2006) devised motivational regulations for Japanese learners of English, in the same way as was done for the psychological needs. The regulations and items are as follows.

**Intrinsic motivation** (four items). This regulation is the most self-determined level and was used to reflect how much the students enjoyed learning English (e.g., “Studying English is fun”).

**Identified regulation** (five items). This regulation is included in external motivation, but is high in self-determination. Participants considered the necessity and importance of English and actively participated in English learning (e.g., “It is important to have English skills”).

**Introjected regulation** (five items). This regulation is strongly related to the self-esteem of learners. Individuals studied English to prevent a negative assessment (e.g., “I want my teacher to think of me as a good student”).

**External regulation** (five items). This is the least self-determined regulation. Learners in this state studied English because of outside pressure or specific rewards (e.g., “One has to study English in this society”).

**Amotivation** (five items). This regulation is indicative of no motivation. Learners in this state considered learning English to be meaningless and refused to study (e.g., “I do not understand why I have to study English”).

See Appendix B for a list of items used.

5. Results
5.1 Motivational Variables

Before conducting factor analysis, we checked the descriptive statistics of each item in each survey and found that several items showed ceiling effects. These were as follows: “For me to become an educated person, I should learn English” (all questionnaires), “Learning English is necessary because it is an international language” (first and last questionnaires), “When I think about my future, it is important that I use English” (first and last questionnaires), and “If I met an English speaker, I would feel nervous” (first questionnaire). Since these items were useful, we have included them in the results and factor analysis.

As an exploratory factor analysis, the principal factor analysis was conducted on the data from the first questionnaire (administered in April), and three factors were yielded. After deleting items with less than 0.4 factor loadings for all factors, we conducted the maximum likelihood factor analysis with promax rotation. We then
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decided to use the three factors provided as default: ought-to L2 self (Factor 1), anxiety (Factor 2), and ideal L2 self (Factor 3). Table 1 shows the result of the factor analysis.

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

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

<table>
<thead>
<tr>
<th>Factor 1: Ought-to L2 self</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 When I think about my future, it is important that I use English.</td>
<td>0.95</td>
<td>0.01</td>
<td>-0.09</td>
</tr>
<tr>
<td>9 Learning English is necessary because it is an international language.</td>
<td>0.89</td>
<td>0.09</td>
<td>-0.15</td>
</tr>
<tr>
<td>6 If I made the effort, I could learn a foreign language</td>
<td>0.69</td>
<td>-0.14</td>
<td>0.12</td>
</tr>
<tr>
<td>7 The things I want to do in the future require me to speak English.</td>
<td>0.59</td>
<td>0.15</td>
<td>0.26</td>
</tr>
<tr>
<td>3 For me to become an educated person I should learn English.</td>
<td>0.58</td>
<td>0.15</td>
<td>0.06</td>
</tr>
<tr>
<td>I would like to be able to use English to communicate with people from other countries.</td>
<td>0.52</td>
<td>-0.24</td>
<td>0.28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor 2: Anxiety</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 I am worried that other speakers of English would find my English strange.</td>
<td>-0.15</td>
<td>0.85</td>
<td>0.26</td>
</tr>
<tr>
<td>19 If I met an English speaker, I would feel nervous.</td>
<td>0.00</td>
<td>0.74</td>
<td>0.07</td>
</tr>
<tr>
<td>2 I get nervous and confused when I am speaking in my English class.</td>
<td>0.10</td>
<td>0.67</td>
<td>0.00</td>
</tr>
<tr>
<td>20 I would feel uneasy speaking English with a native speaker.</td>
<td>0.15</td>
<td>0.59</td>
<td>-0.17</td>
</tr>
<tr>
<td>8 I always feel that my classmates speak English better than I do.</td>
<td>0.10</td>
<td>0.55</td>
<td>-0.16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor 3: Ideal L2 self</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 I can imagine speaking English with international friends.</td>
<td>-0.13</td>
<td>0.00</td>
<td>0.93</td>
</tr>
<tr>
<td>5 I often imagine myself as someone who is able to speak English. Whenever I think of my future career, I imagine myself being able to use English.</td>
<td>0.09</td>
<td>0.05</td>
<td>0.82</td>
</tr>
<tr>
<td>1 I am sure I will be able to learn a foreign language.</td>
<td>0.14</td>
<td>0.16</td>
<td>0.68</td>
</tr>
<tr>
<td>10</td>
<td>0.13</td>
<td>-0.36</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Correlation Factor: 1 2 3
1 0.12 1
2 0.50 -0.34 1
Table 2
Mean Scores, Standard Deviation, and Cronbach’s Alpha of Each Subscale and Results of a Repeated Measure ANOVA with Time for Motivational Variables (N = 60)

<table>
<thead>
<tr>
<th></th>
<th>April</th>
<th>July</th>
<th>January</th>
<th>F-value</th>
<th>p</th>
<th>Partial η²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAN (SD)</td>
<td>MEAN (SD)</td>
<td>MEAN (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ought-to L2 self</td>
<td>5.50 (1.18)</td>
<td>5.43 (0.97)</td>
<td>5.47 (1.10)</td>
<td>0.15</td>
<td>.860</td>
<td>.00</td>
</tr>
<tr>
<td>焦虑</td>
<td>5.21 (1.22)</td>
<td>5.26 (1.09)</td>
<td>5.15 (1.05)</td>
<td>0.41</td>
<td>.664</td>
<td>.01</td>
</tr>
<tr>
<td>Ideal L2 self</td>
<td>3.25 (1.40)</td>
<td>3.40 (1.42)</td>
<td>3.45 (1.43)</td>
<td>1.11</td>
<td>.334</td>
<td>.02</td>
</tr>
</tbody>
</table>

Figure 1. The graph shows the changes in motivational variables in accordance with time.

5.2 Perceived Competence
With regard to the motivational variables, the principal factor analysis was conducted and three factors were extracted. After deleting two items with less than 0.4 factor loadings for all factors, we also conducted a maximum likelihood factor analysis with promax rotation. We then decided to use three factors suggested by the data: presentation (Factor 1), knowledge (Factor 2), and comprehension (Factor3). Table 3 shows the results of the factor analysis.

Table 4 shows the means (MEAN), and standard deviations of items for the three subscales suggested by the factor analysis and Cronbach’s alphas for those subscales. The table also presents the results of a repeated measure ANOVA with time (1: April; 2: July; 3: January) as within-group factors. The results showed that all factors were
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not high in April. As shown in figure 2, all factors increased from April to January. Furthermore, there was a statistically significant increase in presentation and knowledge.

Table 3

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

<table>
<thead>
<tr>
<th>Factor 1: Presentation</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 I can give a presentation in English.</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.54</td>
</tr>
<tr>
<td>10 I can research necessary information and present the result.</td>
<td>0.57</td>
<td>0.43</td>
<td>0.19</td>
<td>0.55</td>
</tr>
<tr>
<td>9 I can speak English with the knowledge of correct pronunciation.</td>
<td>0.53</td>
<td>0.30</td>
<td>0.02</td>
<td>0.41</td>
</tr>
<tr>
<td>6 I can write English materials for a presentation.</td>
<td>0.52</td>
<td>0.49</td>
<td>-0.10</td>
<td>0.58</td>
</tr>
</tbody>
</table>

Factor 2: Knowledge

| 7 I can choose an appropriate vocabulary when writing English. | 0.36 | 0.79 | -0.30 | 0.66 |
| 8 I know the grammatical rules and different parts of speech. | 0.35 | 0.52 | -0.12 | 0.48 |
| 11 I can see the difference between written and spoken English. | 0.11 | 0.51 | 0.17 | 0.36 |
| 12 I can make myself understood by everyone. | 0.43 | 0.48 | -0.03 | 0.51 |
| 3 I can check my English writing using dictionary and textbooks. | 0.44 | 0.46 | 0.00 | 0.52 |

Factor 3: Comprehension

| 13 I can understand what is spoken in English. | 0.16 | 0.32 | 0.73 | 0.48 |
| 2 I can understand English documents. | 0.25 | 0.36 | 0.52 | 0.47 |
| 14 I can catch what native English speakers say. | 0.14 | 0.44 | 0.46 | 0.40 |

Correlation Factor:

| 1 1 |
| 2 0.47 1 |
| 3 0.57 0.38 1 |
Table 4

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

<table>
<thead>
<tr>
<th>Subscale</th>
<th>April MEAN (SD)</th>
<th>July MEAN (SD)</th>
<th>January MEAN (SD)</th>
<th>α</th>
<th>F-value</th>
<th>p</th>
<th>Partial ( \eta^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation</td>
<td>2.01 (0.54)</td>
<td>2.41 (0.48)</td>
<td>2.46 (0.49)</td>
<td>.72</td>
<td>29.66</td>
<td>.000</td>
<td>.34</td>
</tr>
<tr>
<td>Knowledge</td>
<td>2.13 (0.52)</td>
<td>2.32 (0.37)</td>
<td>2.26 (0.45)</td>
<td>.72</td>
<td>7.36</td>
<td>.001</td>
<td>.11</td>
</tr>
<tr>
<td>Comprehension</td>
<td>2.08 (0.51)</td>
<td>2.18 (0.47)</td>
<td>2.21 (0.50)</td>
<td>.50</td>
<td>2.04</td>
<td>.135</td>
<td>.03</td>
</tr>
</tbody>
</table>

Figure 2. This figure presents the changes of perceived competence in accordance with time.

5.3 Psychological Needs

The categories were used in accordance with Hiromori (2006). Table 5 shows the mean scores (MEAN), standard deviations, and Cronbach’s alphas of each of the psychological needs and the results of a repeated measure ANOVA with time (1: April; 2: July; 3: January) as within-group factors. The results of the ANOVA show a statistically significant increase in all needs with time. As shown in Figure 3, all needs increased steeply from April to July, and relatedness and competence continued to increase from July to January.
Examining the Motivational Effect of Presentation-Based Instruction on Japanese Engineering Students

Table 5
The Means, Standard Deviations, and Cronbach’s Alphas of Each Psychological Need and Results of a Repeated Measure ANOVA with Time for Three Psychological Needs

<table>
<thead>
<tr>
<th></th>
<th>April</th>
<th>July</th>
<th>January</th>
<th>F-value</th>
<th>p</th>
<th>Partial η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy</td>
<td>2.37 (.70)</td>
<td>3.30 (.45)</td>
<td>3.21 (.47)</td>
<td>81.38</td>
<td>.000</td>
<td>.59</td>
</tr>
<tr>
<td>Competence</td>
<td>2.48 (.60)</td>
<td>3.13 (.52)</td>
<td>3.18 (.59)</td>
<td>46.17</td>
<td>.000</td>
<td>.44</td>
</tr>
<tr>
<td>Relatedness</td>
<td>2.86 (.68)</td>
<td>3.44 (.51)</td>
<td>3.64 (.64)</td>
<td>35.30</td>
<td>.000</td>
<td>.38</td>
</tr>
</tbody>
</table>

Figure 3. This figure shows the changes in three psychological needs in accordance with time.

5.4 Motivational Regulations
As with the three psychological needs, the categories of motivational regulations were used in accordance with Hiromori (2006). Table 6 presents means (MEAN) and standard deviations of motivational regulations, Cronbach’s alphas, and the result of a repeated measure ANOVA with time (1: April; 2: July; 3: January) as a within-group factor. The ANOVA showed that amotivation significantly decreased from July to January. There was no significant change in the remaining motivational regulations. As can be seen in Figure 4, mean identified regulation was always the highest value, followed by introjected regulation and external regulation. Intrinsic motivation and amotivation were associated with comparatively low mean values.
Table 6
*Mean Scores, Standard Deviations, and Cronbach’s Alphas of Each Motivational Regulation and Results of a Repeated Measure ANOVA with Time for Motivational Regulations*

<table>
<thead>
<tr>
<th></th>
<th>April</th>
<th>July</th>
<th>January</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAN (SD)</td>
<td>MEAN (SD)</td>
<td>MEAN (SD)</td>
<td>α</td>
<td>α</td>
<td>F-value</td>
<td>p</td>
<td>Partial η²</td>
</tr>
<tr>
<td></td>
<td>MEAN</td>
<td>α</td>
<td>MEAN</td>
<td>α</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic</td>
<td>2.95 (0.89)</td>
<td>.82</td>
<td>3.08 (0.77)</td>
<td>.80</td>
<td>3.01 (0.88)</td>
<td>.86</td>
<td>1.92</td>
<td>.365 .02</td>
</tr>
<tr>
<td>Identified</td>
<td>3.99 (0.80)</td>
<td>.88</td>
<td>3.83 (0.72)</td>
<td>.84</td>
<td>3.98 (0.72)</td>
<td>.82</td>
<td>2.39</td>
<td>.097 .04</td>
</tr>
<tr>
<td>Introjected</td>
<td>3.60 (0.78)</td>
<td>.53</td>
<td>3.54 (0.80)</td>
<td>.64</td>
<td>3.61 (0.70)</td>
<td>.52</td>
<td>0.36</td>
<td>.698 .01</td>
</tr>
<tr>
<td>External</td>
<td>3.07 (0.82)</td>
<td>.64</td>
<td>3.08 (0.80)</td>
<td>.55</td>
<td>3.10 (0.82)</td>
<td>.58</td>
<td>0.06</td>
<td>.945 .00</td>
</tr>
<tr>
<td>Amotivation</td>
<td>2.53 (0.77)</td>
<td>.74</td>
<td>2.53 (0.76)</td>
<td>.75</td>
<td>2.28 (0.73)</td>
<td>.76</td>
<td>4.57</td>
<td>.012 .07</td>
</tr>
</tbody>
</table>

*Figure 4.* It shows how motivational regulations of participating students changed in accordance with time.

5.5 Identifying Subgroups of Learners Based on Motivational Profiles

A hierarchical cluster analysis, using a ward method with Euclidian distance, was performed using five motivational regulations in the first questionnaire (administered in April) to identify the subgroups of learners, based on motivational tendencies. After studying 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.
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Table 7

*Results of Cluster Analyses Using Five Motivational Regulations in the First (April) Questionnaire (Euclidian Distance, Ward Method)*

<table>
<thead>
<tr>
<th></th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Cluster 3</th>
<th>df</th>
<th>F-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>22</td>
<td>13</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic</td>
<td>3.82 (0.44)</td>
<td>1.92 (0.33)</td>
<td>2.72 (0.62)</td>
<td>2.56</td>
<td>61.57</td>
<td>.000</td>
</tr>
<tr>
<td>Identified</td>
<td>4.48 (0.45)</td>
<td>2.83 (0.48)</td>
<td>4.17 (0.55)</td>
<td>2.56</td>
<td>47.3</td>
<td>.000</td>
</tr>
<tr>
<td>Introjected</td>
<td>3.95 (0.73)</td>
<td>2.77 (0.71)</td>
<td>3.72 (0.47)</td>
<td>2.56</td>
<td>14.72</td>
<td>.000</td>
</tr>
<tr>
<td>External</td>
<td>2.58 (0.74)</td>
<td>3.03 (0.67)</td>
<td>3.54 (0.71)</td>
<td>2.56</td>
<td>10.63</td>
<td>.000</td>
</tr>
<tr>
<td>Amotivation</td>
<td>2.07 (0.61)</td>
<td>3.08 (0.79)</td>
<td>2.65 (0.68)</td>
<td>2.56</td>
<td>9.56</td>
<td>.000</td>
</tr>
</tbody>
</table>

*Figure 5.* The graph shows the motivational profile of each cluster.

As shown in Figure 5, cluster 1 shows the highest levels of intrinsic motivation, identified regulation, and introjected regulation. Cluster 2 is the highest at amotivation, and showed the lowest intrinsic, identified, and introjected regulations. Cluster 3 did not score as highly as cluster 1 with regard to intrinsic motivation, but had comparable scores at identified and introjected regulations.

When 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 as F(2,112) = 3.82 p = .0060. Further research with Tukey showed that cluster 2 significantly increased from first questionnaire (April) to the second questionnaire (July). Although there was not a significant main effect of time-by-
cluster for ought-to L2 self and ideal L2 self, the results of closer analysis showed an increase of ideal L2 self of cluster 2 from April to January; however, it was not statistically significant after applying Bonferroni’s adjustment. Ought-to L2 self was also statistically insignificant, but showed a slight increase of cluster 3 from July to January.

Table 8
A Summary of Cluster Characteristics: Mean Scores and Standard Deviations of Intrinsic Motivation, Ought-to L2 Self, and Ideal L2 Self with Results of a Repeated Measure ANOVA with Time

<table>
<thead>
<tr>
<th></th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Cluster 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>df</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intrinsic Motivation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>2.42</td>
<td>2.24</td>
<td>2.33</td>
</tr>
<tr>
<td>F-value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial η²</td>
<td>.05</td>
<td>.40</td>
<td>.03</td>
</tr>
<tr>
<td><strong>Ought-to L2 self</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>6.04(1.20)</td>
<td>4.56(1.08)</td>
<td>5.51(0.89)</td>
</tr>
<tr>
<td>July</td>
<td>6.02(0.73)</td>
<td>4.37(1.06)</td>
<td>5.47(0.59)</td>
</tr>
<tr>
<td>January</td>
<td>5.75(1.26)</td>
<td>4.53(0.91)</td>
<td>5.72(0.72)</td>
</tr>
<tr>
<td>F-value</td>
<td>.552.552</td>
<td>.585.518</td>
<td>1.906.171</td>
</tr>
<tr>
<td>Partial η²</td>
<td>.03</td>
<td>.05</td>
<td>.08</td>
</tr>
<tr>
<td><strong>Ideal L2 self</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>4.48(1.09)</td>
<td>2.10(0.81)</td>
<td>2.72(1.00)</td>
</tr>
<tr>
<td>July</td>
<td>4.58(1.23)</td>
<td>2.42(1.03)</td>
<td>2.90(1.01)</td>
</tr>
<tr>
<td>January</td>
<td>4.38(1.37)</td>
<td>2.94(1.49)</td>
<td>2.88(0.99)</td>
</tr>
<tr>
<td>F-value</td>
<td>.18.833</td>
<td>4.08.030</td>
<td>0.36.698</td>
</tr>
<tr>
<td>Partial η²</td>
<td>.00</td>
<td>.25</td>
<td>.02</td>
</tr>
</tbody>
</table>

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Figure 6. This graph presents how intrinsic motivation of each cluster has changed in accordance with time.

Figure 7. This graph shows the changes of ought-to L2 self of each cluster in accordance with time.

Figure 8. This figure shows the changes of ideal L2 self of each cluster in accordance with time.

Figure 7 shows that clusters 1 and 3 were high in the mean score of ought-to L2 self, whereas cluster 2 was much lower than the other clusters. Figure 8 shows that the means score of cluster 1 in ideal L2 self was significantly higher than those of the other clusters.

6. Discussion

The mean scores of ought-to L2 self and anxiety were relatively high, whereas those for ideal L2 self were low (see section 5.1). The items categorized in the ought-to L2 self primarily asked the participants questions regarding the necessity of learning English for their future career, while those in the ideal L2 self were more concerned
with the self-image of the participants as English speakers. This indicates that the students seem to understand the career demands of learning English, and have developed the sense of “ought to learn English.”

The motivational regulations results (see section 5.4) showed that identified regulation was associated with the highest mean score, followed by introjected regulation, while the mean score for intrinsic motivation was relatively low. As shown in Figure 4, this group of engineering students was not very intrinsically motivated, but was highly self-determined to learn English.

The following will provide answers to the research questions posed previously, as we discuss our results.

6.1 What Kind of Motivational and Emotional Effect Does a Presentation-Based Course Possess?

The results showed that there was a statistically significant increase in the perceived competence of both presentation and knowledge (see section 5.2). This means that the study participants gained their confidence in their knowledge of the English language, as well as in English presentation skills, through a presentation-based course.

There was a significant increase in all three psychological needs from April to July (see section 5.3). As explained in the latter section, the questionnaire given in April asked questions regarding previous general English courses that the participants had taken, while the questionnaires administered in July and January asked questions that were specifically related to the technical English course taught by the first author. Therefore, the significant difference observed between the data obtained from the April and July questionnaires indicated that a presentation-based course was more adequate than the other English courses in satisfying all psychological needs.

However, although the presentation-based course satisfied these needs, there was a significant change in amotivation only, which decreased from July to January, as shown in section 5.4. Amotivation measured the degree to which students perceived learning the English language to be meaningless. Therefore, we can say that the students in this study attached greater necessity and importance to learning English if it was learned through a presentation-based course. We also feel that a little more time may be required for the satisfied needs to be reflected in more self-determined regulations in language learning.
6.2 Can We Identify Groups Who Have Different Motivational Tendencies with Different Reactions to Project-Based Teaching?

The clusters provided and described in section 5.5 allowed us to see such differences according to different motivational levels. Cluster 1 showed the highest intrinsic motivation score and was associated with relatively high identified and introjected regulations scores, making it the most intrinsically motivated group. Cluster 2 had the lowest scores at most indicators, but higher scores for external regulation and amotivation, so this group was of the least self-determined level. Cluster 3 did not have high intrinsic motivation, but scored better in identified and introjected regulations, 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. The closer analysis showed a significant increase in the intrinsic motivation of the least self-determined group (Cluster 2). This group also showed a slight increase of ideal L2 self from April to July, although it was not statistically significant. From these results, we can conclude that the presentation-based class was effective in enabling the least motivated students to become more intrinsically motivated to learn English and to have a clearer ideal self of using this language.

The results shown in Figures 7 and 8 indicate the relationships between the two theories we used in this study: the L2 motivational self system and SDT. Figure 7 showed that the two highly self-determined groups (Cluster 1 and 3) scored rather high in ought-to L2 self, whereas Figure 8 shows that only the intrinsically-motivated group (Cluster 1) scored significantly high in ideal L2 self. These figures suggest that possession of a clearer vision of ideal L2 self is strongly related to high level of intrinsic motivation, and that the images of ideal L2 self and ought-to L2 self influence the internalization of English learning and self-determination levels.

7. Conclusion

This study found that the engineering students who participated were highly aware of the necessity of learning English, but were highly anxious about using it, and have little confidence in doing so. However, they have come to perceive their English competence as being higher than previously, and to recognize that the learning of English is a meaningful activity. Although it may take more time to construct a clear image of the ideal L2 self, we believe that a presentation-based course is a sufficiently
practical English-learning activity. The results also showed that, from a psychological needs perspective, the presentation-based course evaluated was more satisfying for students than their previous English courses, in which translation and reading were the main activities. Moreover, this presentation-based course increased intrinsic motivation in the least-motivated students, so we can say that a presentation-based course may be the most effective in engaging those students who have the least motivation.

This study revealed that participants who had been viewed as having little motivation to learn English actually realized its necessity and were in fact highly motivated, although their motivation was rather instrumental or extrinsic. The results also demonstrated that the ideal L2 self influences internalization of motivation to learn English, and that the presentation activity was meaningful and effective in allowing not only engineering students, but learners of English as a foreign language in general, to grow in confidence.

A limitation of this study is that the sample size was not sufficient, and that many students did not participate in all surveys. The results could be different if we included the data of those who participated only once or twice. It may also be necessary to study exactly how the English competency of the students developed through presentation-based instruction. Along with the results of our preliminary study, this investigation showed the effectiveness of a presentation-based course as a method to train students to speak English in the classroom setting. In the future, we plan to include qualitative analysis of the portfolios of the students to more closely examine the process by which their motivation and learning changes through presentation activities. We believe that this study could introduce a new perspective on understanding the attitude and motivation of engineering students towards learning English, as well as the effectiveness of a presentation-based course.

Notes

1. Since the Cronbach's alpha of the construct of autonomy in July and January were low, we removed one item suggested by the data. We then decided to use the remaining five items for the autonomy.

2. In order to increase reliability (Cronbach's alpha), we removed two items suggested by the data. We then decided to use the remaining three items for the introjected regulation.

3. The Cronbach's alpha of external regulation was also low. We removed two items suggested by the data and decided to use the remaining three for the external
regulation.
4. Table 7 presents the mean scores and standard deviations of motivational regulations of each cluster as well as the results of ANOVA.

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MAEKAWA, Yoko • YASHIMA, Tomoko

college engineering professors


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Yamauchi, H. (2005). Kogaku-kei ESP no tame no syllabus to kyozai kaihatsu ni muketa needs bunseki; kogaku-kei (Kurume kogyo daigaku) no ba-ai [Needs analysis for developing engineering ESP syllabus and teaching material; case of engineering (Kurume institute of technology)] *ESP no kenkyu to jissen [ESP research and practice]*, 4, 70–90.


Appendices

<Appendix A>

Items for the “three psychological needs”

Autonomy

• My teacher always decides what to study in the English/Technical English course. (reverse)
• I can choose between several homework tasks in English/Technical English classes.
• (My) Teacher asks for the opinions of students about the content and/or procedure of the class.
• The opinions of students are taken into consideration in the English/Technical English class.
• My opinions are valued in learning English/Technical English.
• I have feel pressures when attending the English/Technical English class.

Competence
• I am sometimes encouraged by my friends and teacher during the English/Technical English class.
• I am satisfied with my performance in the English/Technical English class.
• I think I will get good grades in the English/Technical English class.
• I sometimes feel that I am not good at English. (reverse)
• I think I will succeed in this English/Technical English class if I try hard.
• I feel a sense of accomplishment in the English/Technical English class.

Relatedness
• I get along with my classmates in the English/Technical English class.
• I think I can study English collaboratively with my classmates.
• For me classmates in the English/Technical English class are my “true friends.”
• There is an atmosphere of collaborative learning with classmates in the English/Technical English class.
• I think I am studying collaboratively in group by working with my classmates.
• I do not think there is a friendly atmosphere in the English/Technical English class. (reverse)

<Appendix B>

Items for the “motivational regulations”

Question: Why do you think you are studying English?

Intrinsic motivation
• Studying English is fun.
• English class is fun.
• It is rewarding when I make new discoveries by studying English.
• Because it is enjoyable to increase my knowledge of English.

Identified regulation
• I want to acquire English skills for use in the future.
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- It is important to have English skills.
- It is important for me to become able to use English.
- I want to be able to speak at least one foreign language.
- I think it is good for my personal development.

Introjected regulation
- I want my teacher to think of me as a good student.
- I may regret it later if I do not study English now.
- I may be cool if I can speak English.
- I would feel guilty if I did not study English.
- It is normal to be able to use English.

External regulation
- I want to get a good grade.
- It is expected that one study English.
- Parents and teachers nag me to study English.
- I want to get a certificate like STEP and TOEIC.
- One has to study English in this society.

Amotivation
- I do not understand why I have to study English.
- I feel I cannot get good results even if I studied English hard.
- I do not want to know why I must study English.
- I feel that studying English is a waste of time.
- I do not know what value there is in learning English.