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EFL Motivation and Possible Selves: A Comparison of Technical College and University Students in Japan

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第二言語英語教育における動機付けと可能自己—日本での高専学生と大学生を比較する場合

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Abstract

Despite needing English for their professional careers, Japanese students majoring in science, technology, engineering, and mathematics (STEM) experience problems with language learning motivation. Building on previous studies indicating demotivation among such students, this paper presents results from a large-scale study of English as a Foreign Language (EFL) students in STEM programs in technical high schools and universities. Using a questionnaire of 48 Likert-type items measuring nine motivational, psychological, and social factors, including anxiety, perceived classroom atmosphere, international friendship, and Possible L2 Selves ($N = 2,253$), data were fit to an existing structural equation model and MANOVA was conducted to compare the two groups. Findings indicated that the Ideal L2 Self was not as pertinent as the Ought-to L2 Self for both groups of students. While both groups had a strong sense of the value of English for careers, technical college students had a lower sense of a supportive classroom atmosphere, less interest in English-speaking cultures, and a weaker sense of an ideal self. Results demonstrated the influence of the social context both inside and outside the classroom environment, while also suggesting that improving classroom group dynamics and activities may encourage a stronger sense of supportive class structures and perceived competence.

Keywords: Ideal L2 self; motivation; ought-to L2 self; self-consistency; STEM students; classroom atmosphere

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INTRODUCTION

Learner motivation is a prime concern in the field of applied linguistics. Studies across various second language (L2) educational contexts have investigated the theorized properties of Dörnyei's (2005, 2009) *L2 motivational self system*, from Hungary to Pakistan to Chile (e.g., Csizér & Lukács, 2010; Islam et al. 2013; Kormos et al. 2011), and particularly those within and similar to the Japanese English as a foreign language (EFL) context of the present study, such as Korea, China, and Iran (e.g., Kim, 2009; Ryan, 2009; Taguchi et al. 2009; Yashima, 2009). Worldwide, EFL contexts share some common problems in learner motivation. For example, demotivation tends to occur under the classroom condition of exam-oriented learning, in which receptive grammatical knowledge is a focus and experiences of failure cause losses in self-confidence (Falout, 2013; Kikuchi, 2013; Sahragard & Alimorad, 2013). Additionally, perceived social values can bring excessive expectations for attaining proficiency, which itself can demotivate learners (Kim & Seo, 2012).

English education in Japan may be best known as a learning context of motivational crisis (Dörnyei & Ushioda, 2011; Ushioda, 2013). Perhaps most at risk are learners of science, technology, engineering, and mathematics (STEM), who appear the least able of all study majors in Japan to retain English learning motivation during their secondary and tertiary schooling (Life et al. 2009; Apple et al. 2013). Given the dominance of English in the global scientific community, whose cooperation and collaboration is depended upon more than ever for human and planetary welfare, this lack of motivation should raise concern among educators.

Aggregated findings from three related studies by the authors, totaling 3,552 participating STEM students studying EFL in Japan, led to two points of conclusion (Hill et al. 2013). First, the learners generally felt that their classrooms were not supportive enough to provide them confidence to

use English, which in turn negatively influenced their ability to see themselves as competent speakers in the future (i.e., a psychological variable called the Ideal L2 Self). Second, the learners clearly perceived strong societal expectations to use English, particularly for their careers, which in turn positively influenced a sense of obligation to use English in the future (a psychological variable called the Ought-to L2 Self). Thus, Japanese STEM students generally did not perceive themselves as having the ability to become future users of English yet felt the pressing need to do so. Reasons for this discrepancy or lack of self-consistency between these two different aspects of possible selves are as yet unknown. The present study will attempt to clarify what academic environments and experiences may be influencing or leading to divided motivations, what differences in motivational influences may exist between different student populations, and what implications there may be for improving EFL learning for STEM students in Japan specifically and for L2 learning more broadly.

BACKGROUND

English future self guides

Future self guides connect one's identity with motivated behavior. This connection can be understood as a process of envisioning what looks possible for one to become in the future and then taking action in the present toward becoming it. The original motivational framework, called *possible selves theory* by Markus and Nurius (1986), outlined three types of visions of possible selves and the different ways they influence individuals. A vision of what one would like to become is the *ideal self*, what one seems likely to become is the *probable self*, and what one is afraid of becoming is the *feared self*. These images are not generated outside of context or reference; they are derived from comparisons of one's self with others (models) that one sees within the social

environment. In short, an individual can be motivated by such thoughts as, “What others are now, I could become” (Markus & Nurius, 1986, p. 954).

The most influential visions of self guides come from that which is imagined most often and most vividly, and the immediate social context provides people who serve as potential models for such imagined selves. These models may invoke a positive (ideal self) or negative (feared self) impression (Markus & Nurius, 1986). Self guides inform the individual who imagines them through a psychological process described by Higgins (1987) as *self-discrepancy*. A lack of correspondence or harmony that exists between the images of one’s self in the present and the future may cause a desire to decrease this divide between the two selves. Self-regulated action to bring together the self in the present (what one is not) with the self in the future (what one can become) helps one to learn from and adapt to the environment by attempting to create a self-consistent identity. This sense of completeness or balance is known as *self-consistency* (Higgins, 1987). The process of self-discrepancy influences motivated behavior in two separate ways. In a *promotion focus*, it can guide one toward what one wishes to become, whereas in a *prevention focus*, it guides one away from what one does not wish to become (Higgins, 1996, 1998).

Possible selves theories inform current research into L2 motivation theories. The most well-known framework is Dörnyei’s (2005, 2009) L2 motivational self system comprising three constructs. The *ideal L2 self* has a promotion focus and is conceived as an image of the best user of the target language a learner can imagine becoming. Vivid images of fluent use are believed to act as powerful self guides. The *ought-to L2 self* acts primarily from a prevention focus and guides learners away from poor outcomes, such as failing a test. Finally, the *L2 learning experience* relates to the immediate learning context and experience that sustains present motivated behavior. In other words, it is a factor that can help keep learners on task, especially when there are

potential distractions.

Dörnyei and Ushioda (2011) explained that future L2 self guides do not automatically lead to self-regulated L2 learning, but that certain conditions are necessary for these capacities to manifest into motivated actions. These requirements were first proposed by Dörnyei and Ushioda (2011), largely corroborated in a recent study (Chan, 2013), and encapsulated in Muir and Dörnyei (2013, p. 362; italics in original):

- A learner must *have* an ideal self.
- A learner’s ideal self must be *elaborate* and *vivid*.
- A learner’s ideal self must be *sufficiently different* from a learner’s present self.
- A learner must believe that it is *not comfortably certain* that they will reach their goal.
- A learner’s ideal self must be perceived as *plausible*.
- A learner’s ideal self *must not clash* with their ought-to self or other elements of their self-concept.
- A learner’s ideal self must be *regularly activated* in their working self-concept.
- A learner’s ideal self must be contrasted by a *feared self*, depicting possible consequences should they fail to achieve their goals.
- A learner’s ideal self must be accompanied by *procedural strategies*, which allow for a *roadmap* to be created in the mind of the learner.

English classrooms in Japan

The introduction and exposure of Japanese EFL learners to English is complex. Students in almost all Japanese junior and senior high schools study English for a total of six years, and only recently has the government mandated English studies starting in the fifth and sixth grades of elementary school (MEXT, 2002). Public secondary schools spend most of their efforts preparing students for university entrance exams, although private school systems may not include such exams if students transfer to the parent university affiliated

with their high school. Students who proceed into tertiary education encounter differences in EFL education, as colleges and universities have diverse curricula in which students may or may not be required to continue learning English.

Perhaps the most common EFL learning experiences in Japan are the high amount of students' time spent in passive, teacher-centered learning environments, especially during junior high school and high school (Gorsuch, 1998; Nishino, 2011). Oral Communication classes were established in secondary education to help meet the 1989 guidelines of the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), which mandated an educational goal that students become able to express their thoughts in spoken English (Taguchi, 2005). However, over a decade after the MEXT guidelines took effect, year-long weekly visits to multiple classrooms of three teachers in secondary education, plus one-day visits to classrooms of four other teachers, provided Sakui (2004) with the following description of classroom practices:

In overall actual classroom teaching, grammar instruction was central, and far more foregrounded than CLT [communicative language teaching]. The language of instruction and class management was Japanese. Teachers spent most of the class time involved in teacher-fronted grammar explanation, chorus reading, and vocabulary presentation. Students attended to teachers' explanations, learnt to translate at the sentence level, read the textbook aloud in choral reading, copied vocabulary items in their notebooks, and engaged in sentence manipulation exercises . . . if any time at all was spent on CLT it was a maximum of five minutes out of 50. (p. 157)

Taguchi's (2005) observations from four visits at two different high schools yielded similar results. Teachers had control of the lesson content and task choice 100% of the time, with 50% to 90% of the time spent on grammar-focused instruction, even when conducting spoken exercises from

the textbooks. Speaking practice comprised less than 15% of class time, even in Oral Communication classes. Also, textbooks approved by the Japanese Ministry of Education have been criticized for containing mechanical and structured exercises that do not provide "cognitively complex language activities such as negotiation of meaning or imaginative projection" (Taguchi, 2005, p. 4). Moreover, while Japanese EFL teachers generally believe that communicative language activities in the classroom are beneficial, in practice they continue to rely on rote memorization, translation, and whole class choral repetition due to class size, low confidence, and a lack of pre-service teacher training (Nishino, 2008, 2011). Coupled with a general lack of English speaking by teachers in secondary schools, these factors can make students wonder for what purposes they are learning English (Tanaka, 2011). Despite continuing efforts by MEXT to reform English education, including mandating English as the language of instruction starting in 2013 (Tahira, 2012), it seems unlikely that Japanese EFL students will develop a sense of themselves as active users of English by the time they reach university.

STEM students in undergraduate universities

The passive style of English learning experienced in secondary school continues into the undergraduate life. King (2013) found that university students, on average, spent most of their English class time either listening to the teacher (37% of the time) or dropping away from the learning task into chatting in Japanese (20%). Noting the brief times the students were on task, King stressed, "Over a quarter of class time in the study was characterized by an absence of talk from both staff [teachers] and students alike" (King, 2013, p. 16). King concluded that the years spent in passive forms of language study during secondary education, combined with a culture of excessive self-monitoring out of fear of negative peer judgment, led to silence in university language classrooms.

Many Japanese students enter tertiary education via the entrance exam system and pursue an academic career lasting four to six years. Students may also enter via a system where they are recommended by their secondary school, sometimes accounting for large percentages of first-year students at university. Recent studies of the motivation and willingness to speak among various study majors show steadily declining patterns of English learning engagement from junior high school to university (Hayashi, 2005; Johnson & Johnson, 2010; Shibuya, 2005). Thus, there seems to have been little motivational change since Berwick and Ross's (1989) famous description of the situation: "Once the university examinations are over, there is very little to sustain this kind of [instrumental, exam-oriented] motivation, so the student appears in freshmen classrooms as a kind of timid, exam-worn survivor with no apparent academic purpose at university" (p. 206).

The curriculum may further exacerbate the situation in STEM programs, which are typically designed to allow students to fulfill MEXT-mandated liberal arts course requirements, such as English within the first or second year, in order to focus on major-specific courses in the final two years of undergraduate education. Such programs leave obvious gaps in English education for STEM undergraduates to avoid continuing their language studies. One major reason for lack of L2 motivation may be a lack of relevant career-related or discipline-specific English coursework (Kelly, 2005). In an EFL course for medical students, Sakui and Cowie (2008) saw a rise in motivation after class content was changed to include topics relevant to their major. A more recent study by Johnson (2012) demonstrated that engineering students preferred classroom activities typical for communicative learning instruction and disliked materials routinely used in an exam-focused class. Given these facts, compared to students in other study fields, STEM students are more likely to dislike speaking English inside or outside class, to blame poor performances on a perceived lack of ability,

and to generally feel a greater sense of demotivation toward learning English (Life et al. 2009; Falout et al. 2009; Apple et al. 2013; Falout et al. 2013). The silence and lack of active classroom support in Japanese undergraduate university EFL classrooms may severely impair the development of possible L2 selves among Japanese STEM students.

STEM students at colleges of technology

Colleges of technology (*kosen*) in Japan are a particularly unique collection of national, private, and public institutions that function as a practical education in a technical trade or a bridge to post-secondary education in engineering fields. Most students enter at age 15 directly from junior high, and a handful of students at each school transfer at age 18 from a typical three-year-long high school program and enter at the fourth year of this five-year program. Students at *kosen* may complete their studies, earn an associate degree, and enter the workforce upon graduation at age 20, or they may apply to enter their *kosen*'s two-year advanced engineering program or transfer to a four-year university through recommendation or transfer exams that frequently do not contain English sections (KOSEN, 2010). However, because of the relatively greater number of technical course requirements, *kosen* students have less than half the EFL classroom contact hours of regular high school and university students. This lower number of English course requirements at *kosen* has been cited as one cause for lower English ability among *kosen* students compared to their undergraduate university STEM counterparts (Kameyama, 2010).

Kosen graduates are highly sought after by Japanese companies, particularly by manufacturers, who generally tender verbal offers of employment while students are still halfway through their final year of study (Table 1). At the four schools in the present study, the ratio of job offers to students seeking employment were all greater than ten jobs to every applicant. Given that *kosen* students attain employment even before graduation, their perceptions of what companies

Table 1.
Entry Level Job Placement for Graduates of Technical Colleges in Japan in 2005 (derived from KOSEN, 2010)

Type of industry	Ratio (%) of kosen graduate hirees
Manufacturing	54.7
Services	14.2
Information and telecommunications	9.2
Construction	9.1
Transportation	5.4
Electricity, gas, heating supply, and waterworks	4.1
Civil service	2.1
Finance, insurance, and real estate	0.3
Agriculture, forestry, and fisheries	0.1
Mining	0.1
Others	0.6

want regarding their English abilities may therefore highly

influence their L2 motivation and sense of a possible L2 self.

Research questions

Considering the varying backgrounds, identities, and goals of STEM students at technical colleges and universities in Japan, we formulated the following research questions to compare these two systems of engineering education:

RQ-1: What path model differences exist among the variables influencing possible L2 selves for technical college students and undergraduate STEM students in Japan?

RQ-2: How do the students at each type of educational institution differ in perceptions of their English class atmosphere?

RQ-3: How do the students at each type of educational institution differ in perceptions of social expectations to use English?

RQ-4: How do the students at each type of educational institution differ in their possible L2 selves?

MATERIALS AND METHODS

Participants

A total of 2,348 questionnaires were collected from 19 separate institutions across Japan. Following data screening to remove missing, irregular, or set pattern responses, the final participant size was $N = 2,253$. Participants in the study represented a wide range of educational levels from the second year of technical college to university sixth year. Student participants all majored in science or engineering disciplines and were in technical college programs ($n = 1,018$) and undergraduate STEM programs ($n = 1,235$). There were 1,758 male and 486 female students, with 9 students not indicating a gender. The average participant age was 19 (low 15, high 63). Students were of low-intermediate proficiency, based on self-reported standardized test scores (Test of English for International Communication, or TOEIC). TOEIC scores were lower for kosen students ($n = 518$, $M = 344.25$, $SD = 109.28$) than for undergraduate students ($n = 402$, $M = 422.83$, $SD = 140.4$). The average age of kosen students was 18.0, while the average age of undergraduate students was 19.5.

Measurement instrument

The main instrument for this study was a questionnaire, which consisted of six demographic items and 48 items designed to measure motivation and motivation-related variables (Appendix A). Questionnaire items measured the following: (a) Classroom Atmosphere (CA, five items, $\alpha = .82$), (b) Speaking Anxiety (SA, five items, $\alpha = .80$), (c) Interest in English-speaking Culture (IC, five items, $\alpha = .78$), (d) Perceived Speaking Competence (SC, five items, $\alpha = .87$), (e) International Friendship Orientation (IF, six items, $\alpha = .91$), (f) Perceived Social Values of English (SV, five items, $\alpha = .73$), (g) Ideal L2 Self (IS, five items, $\alpha = .87$), (h) Probable L2 Self (PS, five items, $\alpha = .72$), and (i) Ought-to L2 Self (OS, seven items, $\alpha = .78$). Items were based on existing items (Apple, 2011; Fukada, 2009; Ryan, 2009; Taguchi et al. 2009) and previously validated in Apple et al. (2013). A Likert-type scale was used with six categories (1 = “strongly disagree” to 6 = “strongly agree”) and no middle or neutral option. Preliminary data analysis was previously reported in Hill et al. (2013); reliability analysis revealed that three items misfit their intended factors, which were removed from further analysis for this study. Data screening analysis showed a normal distribution across the remaining 45 items. There were 322 missing data points, representing less than 0.003% of the total 101,385 data points (45 items x 2,253 participants). Because this was much less than the maximum

5% suggested (Tabachnick & Fidell, 2007, p. 63), mean scores were imputed in the place of missing data points.

Analysis techniques

To test the first research question, data from the *kosen* students and the university students were fit separately to a hypothesized structural equation model (SEM). The hypothesized model in this study was based on results from Apple et al. (2012, 2013), in which the possible L2 selves are outcome variables, and are influenced by a combination of both individual psychological aspects and perceptions of external social factors (Figure 1). Prior to model fit analysis, a preliminary correlational analysis was conducted to confirm model assumptions (Table 2). Several variables were significantly correlated, confirming validity of the correlational matrix for model testing. Following model fit analysis, a cross-validation analysis was conducted to determine statistical significance of any model path differences between the two participant samples. Due to the large sample size in this study, the fit index of root mean square error of approximation (RMSEA), which is not affected by sample size and additionally provides a 90% confidence interval that increases fit precision, will be reported (MacCallum & Austin, 2000). For this study, an RMSEA index below .08 was considered to show good fit (Browne & Cudek, 1993).

Table 2. Means and Correlations of Motivational Variables for a Combined Sample of Technical College and Undergraduate University STEM Students in Japan

Variables	<i>M</i>	<i>SD</i>	IS	PS	OS	IC	IF	CA	SV	SA	SC
IS	13.83	5.63	-								
PS	18.23	4.85	*.72	-							
OS	28.91	6.51	*.40	*.61	-						
IC	16.28	5.35	*.61	*.56	*.36	-					
IF	22.97	8.08	*.62	*.68	*.46	*.58	-				
CA	16.30	5.34	*.50	*.46	*.37	*.47	*.45	-			
SV	21.28	4.67	*.30	*.51	*.70	*.31	*.44	*.35	-		
SA	19.26	5.44	.02	*.11	*.34	*.10	*.10	*.10	*.29	-	
SC	13.99	5.41	*.62	*.52	*.27	*.51	*.44	*.50	*.25	*-.12	-

Notes. *N* = 2,253; a Likert scale of 1 (strongly disagree) to 6 (strongly agree) was used; IS = Ideal L2 Self ; PS = Probable Future L2 Self; OS = Ought-to L2 Self; IC = Interest in English-speaking cultures; IF = International friendship orientation; CA = Classroom atmosphere; SV = Perceived social value of English; SA = Speaking anxiety; SC = Perceived speaking competence. * = $p < .01$

To test the remaining research questions, the items comprising the nine variables in the study were combined to form aggregate mean scores for each variable. A multiple analysis of variance (MANOVA) was conducted to examine whether the two participant populations of this study, *kosen* students and undergraduate STEM majors, differed on the nine variables. A series of follow-up analysis of variance

(ANOVA) were then conducted to compare the means of individual variables. Because multiple comparisons were conducted, a Bonferroni adjustment was applied to reduce the chance of Type I error, making $p < .006$ for the ANOVAs (.05 divided by nine variables). Effect sizes using partial eta squared (η^2) were computed to control for Type II error.

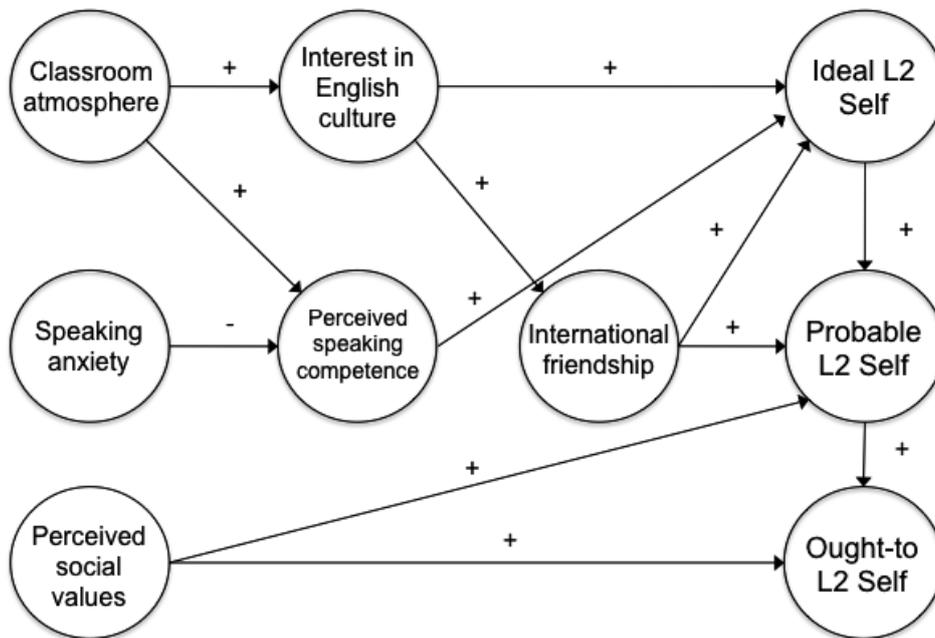


Figure 1. Hypothesized structural equation model of social and psychological variables influencing the development of Possible L2 Selves among Japanese science and engineering students. Based on Apple et al. (2012, 2013).

RESULTS

SEM model

The model was tested using data from both *kosen* students (Figure 2) and undergraduate STEM students (Figure 3). Data from *kosen* students had good fit, RMSEA = .06 (.063 - .066) as did data from undergraduate students, RMSEA = .07 (.064 - .067). Although the path strengths among the variables were slightly different between the two samples,

the most obvious differences were the influence of Classroom Atmosphere (CA) on Interest in English speaking Cultures (IC) (*kosen*, $\beta = .58$; undergraduate, $\beta = .73$) and the influence of Perceived Social Values of English (SV) on Probable L2 Self (PS) (*kosen*, $\beta = .42$; undergraduate, $\beta = .30$). To test whether these path strength differences were significant, a cross-validation analysis was conducted (Table 3). Results indicated a significant difference on one path, CA \rightarrow IC, $\chi^2 = 5.492, p = .019$.

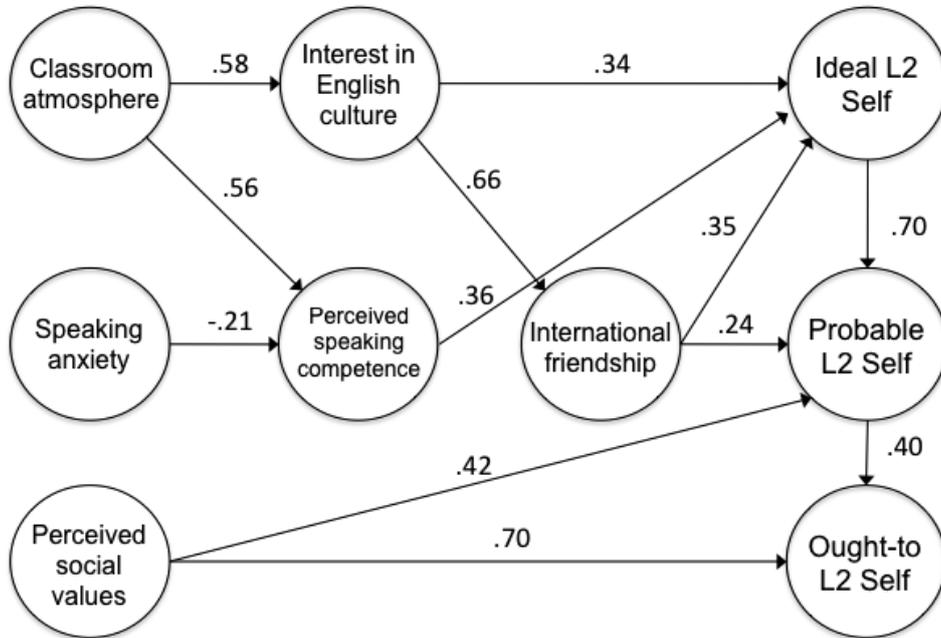


Figure 2. Structural equation model of social and psychological variables influencing the development of Possible L2 Selves for Japanese science and engineering students at technical colleges. $n = 1,018$. RMSEA = .064 (.063 - .066).

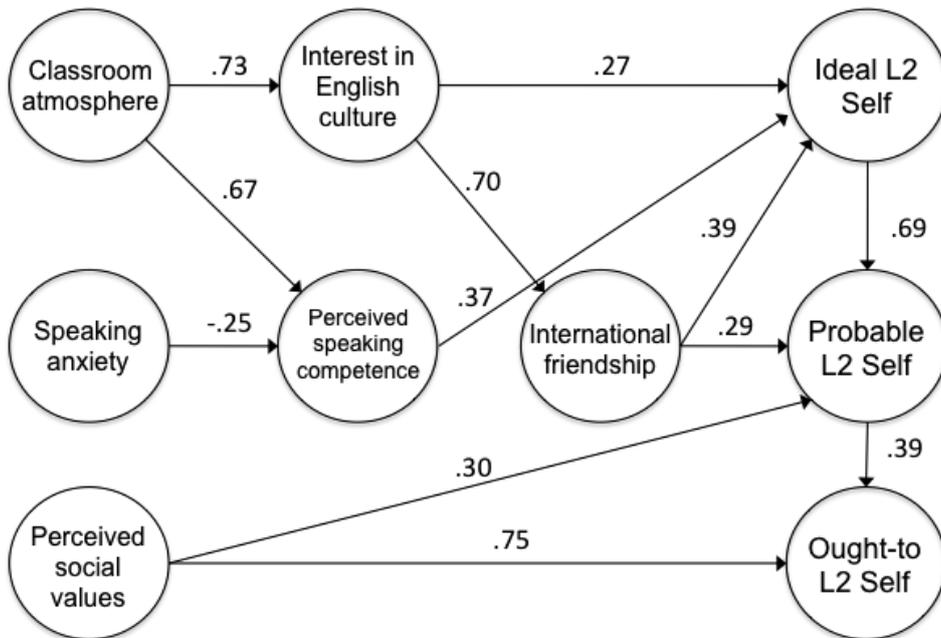


Figure 3. Structural equation model of social and psychological variables influencing the development of Possible L2 Selves for Japanese STEM students at undergraduate universities. $n = 1,235$. RMSEA = .066 (.064 - .067).

Table 3.
Cross-Validation Statistics for Latent Variable Paths

Path	Technical college sample beta weight	Undergraduate sample beta weight	Chi-squared	Probability
CA → IC	.58	.73	5.492	.019
CA → SC	.56	.67	1.276	.259
SA → SC	-.21	-.25	1.499	.221
IC → IF	.66	.70	.113	.737
IC → IS	.34	.27	.205	.651
SC → IS	.36	.37	1.936	.164
IF → IS	.35	.39	.756	.384
IF → PS	.24	.29	1.357	.244
IS → PS	.70	.69	.917	.338
SV → PS	.42	.30	.846	.358
PS → OS	.40	.39	.684	.408
SV → OS	.70	.75	.000	.985

Notes. Technical college sample size was $n = 1,018$; undergraduate sample size was $n = 1,235$; CA = Classroom atmosphere; SA = Speaking anxiety; SV = Perceived social value of English; IC = Interest in English-speaking cultures; SC = Perceived speaking competence; IF = International friendship orientation; IS = Ideal L2 Self; PS = Probable Future L2 Self; OS = Ought-to L2 Self.

MANOVA results

Aggregate mean scores were computed for all dependent variables, and a MANOVA was conducted. There was a statistically significant difference and large effect size between *kosen* students and university students on the combined variables, $F(9,2243) = 39.62, p = .000$, Wilk's $\lambda = .86, \eta^2 = .14$. The mean scores of the dependent variables were then compared separately using ANOVA with the Bonferroni adjustment applied (Table 4). Significant differences were found on five variables: Ideal L2 Self, $F(1,2251) = 12.33, p = .000, \eta^2 = .005$; Interest in English-

speaking Cultures, $F(1,2251) = 10.05, p = .002, \eta^2 = .004$; Classroom Atmosphere, $F(1, 2251) = 238.01, p = .000, \eta^2 = .096$; Speaking Anxiety, $F(1, 2251) = 24.06, p = .000, \eta^2 = .011$; and Perceived Speaking Competence, $F(1, 2251) = 19.49, p = .000, \eta^2 = .009$. Inspection of the aggregate mean scores indicated that compared to undergraduate STEM students, *kosen* students reported less sense of an ideal L2 self, less interest in English-speaking cultures, a much less positive classroom atmosphere, somewhat less speaking anxiety, and slightly less speaking competence.

Table 4.
Multiple Analysis of Variance of Japanese Technical College Students and Undergraduate STEM Students on L2 Motivation-related Variables in the Structural Equation Model

	Technical college students ($n = 1,018$)		Undergraduate STEM students ($n = 1,235$)		F	p	η^2
	M	SD	M	SD			
IS	13.37	5.69	14.20	5.57	12.33	.000	.005
PS	18.15	4.84	18.29	4.86	.44	.508	.000
OS	29.04	6.73	28.78	6.33	.88	.349	.000
IC	15.89	5.33	16.60	5.36	10.05	.002	.004
IF	22.49	8.23	23.36	7.94	6.39	.012	.003
CA	14.48	5.07	17.79	5.08	238.01	.000	.096
SV	21.23	4.84	21.32	4.52	.26	.609	.000
SA	18.64	5.73	19.77	5.14	24.06	.000	.011
SC	18.15	4.84	18.29	4.84	19.49	.000	.009

Notes. A Likert scale of 1 (strongly disagree) to 6 (strongly agree) was used. IS = Ideal L2 Self ; PS = Probable Future L2 Self; OS = Ought-to L2 Self; IC = Interest in English-speaking cultures; IF = International friendship orientation; CA = Classroom atmosphere; SV = Perceived social value of English; SA = Speaking anxiety; SC = Perceived speaking competence; $p < .006$.

DISCUSSION

RQ-1: What path model differences exist among the variables influencing possible L2 selves for kosen students and undergraduate STEM students in Japan?

Regarding path model differences on the motivational variables between the two SEM models, the results of the model cross-validation analysis revealed one significant difference on the path indicating the influence of Classroom Atmosphere on Interest in English-speaking Cultures (CA → IC, $\chi^2 = 5.492$, $p = .019$), with several non-significant differences on paths among other variables (Table 3).

Possible interpretations of this difference might first consider the differences in age and academic experiences between the two groups. *Kosen* students tend to be younger and spend most of their first four years within the same physical classroom with the same classmates, who all belong to the same engineering department. Only in their fifth (i.e., final) year do *kosen* students take individually-chosen labs and elective courses, which may or may not have students from other departments. Although having the same classmates for four years may lead to a greater sense of camaraderie, friendship, and awareness of one's departmental classmates, it also limits social interaction with students who may have different ideas and goals. On the other hand, undergraduates tend to be slightly older. At these ages, even just a year or two difference can provide some students with a greater maturity and wider worldview. Additionally, the academic experiences that undergraduate students receive includes some liberal arts courses, generally spread out across the four years, which typically comprise students from various majors and departments. Thus, undergraduate STEM students have more chances to interact with others and thus gain more exposure to variety in social networks, with accompanying potential to connect to a wider scope of ideas and imaginings about their present purpose in studying English in relation to their futures.

As Classroom Atmosphere has a strong influence on Perceived Speaking Competence (Figs. 2, 3), the relatively lesser sense of a supportive EFL classroom may adversely impact on *kosen* students' confidence as speakers of English. This finding is important, as an EFL context such as Japan affords students few opportunities for English speaking outside school and even inside classrooms ostensibly designed for oral communication learning. Therefore, English interaction in such classrooms may provide the only chance for students to experience oral-based input and output, and thus the only means to build confidence to speak, which is connected to developing a sense of an ideal L2 self.

RQ-2: How do the students at each type of educational institution differ in perceptions of their English class atmosphere?

The MANOVA results show significant difference on Classroom Atmosphere with a moderate to large effect size .096 (Table 4). These results suggest that, despite feeling somewhat demotivated toward English learning, undergraduates generally find their EFL class environment more positive and supportive than *kosen* students do, perhaps for similar reasons about maturity and worldview just described. However, perhaps a more likely explanation stems from the very nature of the EFL classroom in each institutional context. In *kosen*, students study all subjects together with students in the same engineering department. As previously described, students take all classes in the same classroom (their homeroom) with the same classmates for the first four years of the five-year *kosen* program. While also perceiving low positive support for learning English, many *kosen* students in the study may have felt somewhat more comfortable than undergraduate students in the EFL classroom due to extended contact with the same classmates for four straight years, as evidenced by the small but significantly less amount of English speaking anxiety compared to university STEM students.

Kosen students in the study also perceived themselves as having slightly but statistically significant lower English competence than university STEM students. Because *kosen* students must take classes with the same classmates for four years, lower proficiency *kosen* students have no choice but to continue to take the same EFL classes as some higher proficiency classmates. Due to taking the same classes with classmates for many years, *kosen* students also come to know very well everyone's abilities and competencies, a feeling that may lead some of them to perceive a lack of English speaking competence over time from constant comparison of their own abilities and competencies to that of their classmates.

On the other hand, the lack of familiarity with classmates may have led to slightly greater speaking anxiety among undergraduate students. While the university students were studying English with other STEM majors, they were not necessarily taking the same classes with the same classmates in the same department. Therefore, compared to *kosen* students (who only interacted with students of the same study field) undergraduate STEM students were more likely to meet students majoring in non-STEM study fields, whose interest in other cultures may have influenced STEM students during classroom interaction. A weaker pathway from Classroom Atmosphere to Interest in English-speaking Cultures for *kosen* students compared to undergraduate STEM students, combined with a poorer perception of their classroom environment, would predictably lead to a poorer sense of the outcome variable of Ideal L2 Self among *kosen* students. This result is indeed the case, which will be addressed in the section 5.4. RQ-4.

RQ-3: How do the students at each type of educational institution differ in perceptions of social expectations to use English?

Perceived Social Values of English remains high for both sets of students with barely even nominal differences. It would be interesting to investigate further if their perceptions

are unique to their interests as STEM students, or if this might be a common belief across all STEM and non-STEM majors alike within the compulsory, test-driven educational system for EFL in Japan. Perhaps the social expectations of both *kosen* and undergraduate STEM students to attain high levels of L2 proficiency bear upon their motivations negatively, similar to students in the Kim and Seo (2012) study in the Korean EFL context.

RQ-4: How do the students at each type of educational institution differ in their possible L2 selves?

Ought-to L2 Self is just as salient for *kosen* students as for STEM undergrads, but undergrads have significantly more sense of an ideal L2 self and greater interest in English-speaking cultures. *Kosen* students may have underdeveloped images of an ideal L2 self precisely because of the nature of the *kosen* system: students are trained to become entry-level technicians and engineering workers in Japan-based companies, but other than possibly hearing about the requirement for achieving a target score on the TOEIC for certain jobs, *kosen* students may not have a clear idea of to what degree, if any, that their future jobs will need English. The differences between *kosen* and university students regarding interest in English-speaking cultures and ideal L2 selves may be partly attributable to maturity and sophistication; however, it seems more likely that differences in curricula can explain the greater differences in sense of selves and an outside world. For both groups, their ideal L2 selves and probable future selves seem underdeveloped for motivational effect, while their ought-to L2 selves seem to most likely influence motivated learning behaviors.

Apparent with these findings is a salient gap, almost a polarization, between the ideal L2 self and the ought-to L2 self in terms of future English use for both groups of students. According to Dörnyei and Ushioda (2011), such a lopsided set of future selves would theoretically be ineffective in providing the psychological conditions necessary for any

potential motivational effect. They assert that a balanced set of future selves would be necessary to promote motivated action:

The future self [needs to be] in harmony . . . perceived social norms or group norms that are incongruent with the self image (e.g., ‘language learning is girly’) are obviously counterproductive, and so are the ideal and ought self images that are in conflict with each other. (p. 84)

Furthermore, Falout et al. (2013) find that when the gap between possible L2 selves, i.e., the self-discrepancy among various possible self images, reaches a state of *self-consistency* within the individual and *mutual congruency* with the possible L2 selves of other people in the learning environment (i.e., classmates), then a synchronized effect of increased motivated learning behaviors can occur. While undergraduate STEM students in the study had a greater sense of a supportive EFL classroom than the *kosen* students, there was still not enough of a positive classroom environment for the study participants on average to promote the development of motivationally effective images of future selves and English users.

Implications

While the SEM model helps to demonstrate the psychological conditions necessary for possible L2 selves to form, it cannot predict whether or not these possible L2 selves will trigger self-regulated motivational behavior. Given the results in the present study, it could be argued that although STEM students in Japan at both *kosen* and undergraduate levels have a strong ought-to L2 self, this does not seem to be enough for them to attain sufficient English abilities in tertiary education (Hill et al. 2013). It also seems that these students do not have a sufficient sense of an ideal L2 self, which may hinder their career paths upon graduation into the work force. Moreover, students’ stronger ought-to L2 selves seemingly mismatch their weaker ideal L2 selves.

According to the conditions necessary for possible L2 selves to become activated, students must first have a sufficient sense of an ideal L2 self: it must be plausible (i.e., *grounded in reality*; Chan, 2013), and it must be in harmony with the ought-to L2 self (i.e., *self-consistency*). Perhaps a vision of using English in a possible future setting, and in an able-mannered way, seems too remote or implausible for Japanese STEM students.

For pedagogical applications, addressing the prerequisites in the formation of ideal selves seems paramount. This means, according to the SEM model, improving and promoting elements within the classroom environment that can promote the interest in the L2-speaking culture and the speaking confidence of Japanese STEM students, both of which in turn can help develop a stronger, more positive sense of an ideal L2 self. There have been recent attempts by EFL teachers of Japanese university STEM majors to provide classroom activities that remotivate students through the application of possible selves. For example, Munezane (2008) reported on a project-based class in which teams of second-year students were asked to conceive and produce a project in English that their future selves might do. In a second study (Sampson, 2012), learners underwent a series of activities which included imagining failed and successful future selves relating to English, drawing various pathways to becoming a future preferred self, brainstorming blockages in those pathways, and then planning contingencies around the blockages, all the while sharing their individual self views and collaborating on the project. A third study (Kaneko, 2013) involved computer science majors who attended a series of talks from Japanese business professionals serving as models of students’ ideal L2 selves. The invited speakers described their experiences about using English for international business, and consequently students were surveyed to detect L2 motivational changes. Generalizable results across these three studies included an increase in motivation and a raised metacognitive awareness

of the importance of imagining future selves, leading to a decrease in the discrepancy between the learners' present identities and future self guides related to using English.

Also, within the context of EFL learning in Japan, it has been hypothesized that learner motivations can be raised within the framework called present communities of imagining (PCOIZ; Murphey et al. 2012). PCOIZ includes three constructs based on self-identity relating to the target language in three separate, yet ever-unfolding, notional time periods of past, present, and future. One's three notional selves are co-constructed among themselves and among those in the social context, either inside or outside the classroom, as mediated through imagining in the present. In one study with classes at several universities, half of which comprised STEM majors (Falout et al. 2013), learner motivations were elevated and sustained for two consecutive semesters using activities that followed the PCOIZ framework. Although the possible-selves-inspired activities varied among the classrooms, the common feature was that the learners experienced increased interaction using English and felt encouraged to experiment with their L2. Some examples of the activities included sharing language learning histories (past), creating classroom newspapers about their own ongoing learning (present), and enacting an imaginary ten-year class reunion (future). It was theorized that language learning motivation became energized and elevated when learners' past, present, and future selves individually attained self-consistency, and interpersonally attained mutual congruency.

The pedagogical implications of this study may also correspond to L2 learning in other Asian EFL contexts. For example, a study based in Iran found that classroom conditions may impede the development of an ideal L2 self (Papi & Abdollahzadeh, 2012). In the study, many secondary school EFL students had well-developed senses of an ideal L2 self, but this sense generally did not lead to motivated behavior. The authors concluded that "students' ideal L2 selves have remained essentially at the level of

imagination" (p. 588) because the immediate L2 learning experience, a classroom based on passive learning, had not provided students with opportunities to access their future self guides through procedural strategies. Similarly, the initial interest and positive attitudes toward studying English for junior high school students in Indonesia generally dropped due to negative influences of the classroom (Lamb, 2007). Students increasingly became dissatisfied with their teachers, who spent most of the class time implementing oral and written exercises directly from the textbook, and provided few chances for actively using the language. Those who retained positive ideal L2 selves, which were largely derived from their social realm (e.g., parents and presence of a local university), were able to engage in motivated learning behaviors (e.g., singing songs and taking private lessons) only when they were outside of their regular classroom.

Apparent across these studies is the presence of gaps, blockages, or inconsistencies between future self guides and present learning environments, learning conditions that appear to delay if not deteriorate motivational development. Educators should design and implement courses and curricula that bridge gaps, open blockages, and create consistencies between present learning environments and potential future uses of the L2. This might occur in mutual cooperation between teachers and learners, as well as classmates, teachers of other subjects, parents, alumni, and job recruiters. For example, after undergoing outside-of-class counseling to raise their capacity to envision themselves using English in the future, Chinese university students in England and Hong Kong experienced increases in speaking confidence and in the generation of clear and detailed imagery of themselves using English in the future (Magid & Chan, 2012). As the motivational influence of learners' ideal L2 selves became strengthened, improved confidence in using English brought a motivational adjustment or alignment of their feelings within their L2 learning experience.

STEM students especially need help in EFL learning

contexts where exposure to English in daily life is limited. Many Japanese students feel they do not need to learn English for careers within the borders of the country. They need to be awakened to the reality that jobs in STEM fields require English communication even if they never go overseas, communication that typically takes the form of email, faxes, teleconferences, or visits from foreign clients. Teachers can help by raising awareness of the career-related aspects of English to students' future lives that they may not realize they will encounter upon entering the workforce.

CONCLUSION

The results from the present study indicate the Japanese STEM students' sense that their English classrooms tend to poorly support their development as language users, and that this can lead to an underdeveloped sense of ideal L2 self. At the same time, students' awareness of the societal expectations to become proficient users of English seems to provide a strong sense of ought-to L2 self. Therefore, more important than raising STEM students' awareness of the responsibility of striving to become future users of English is an increased focus on augmenting expectations, hopes, and visions of themselves as English users. If STEM students can envision themselves as being capable of and enjoying speaking English, in addition to fulfilling a sense of societal obligation or monetary gain through employment, then their sense of ideal L2 selves can become more self-consistent with their ought-to L2 selves.

The foundation for these students to build this kind of confidence and vision, according to the present model, seems to rest within the classroom environment. For students in the present study, overuse of grammar-based lectures at the secondary educational level seemed to have promoted a reliance on passive learning at the tertiary level. A little more balance in the classroom toward including practical

applications of their L2 knowledge, specifically more chances to practice and improve speaking abilities for career-oriented situations, as well as raising awareness of the actual existence of these situations, might help create a classroom environment more conducive to producing motivations that are in harmony with learning English.

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APPENDIX A

Questionnaire items listed by variable

Classroom Atmosphere ($\alpha = .82$)

- CA1 I like the atmosphere of my university English classes.
- CA2 I always look forward to university English classes.
- CA3 I enjoy speaking in English with my classmates in university English classes.
- CA4 I feel encouraged to use English in my university English classes.
- CA5 I get along with classmates in my university English classes.*

Ideal L2 Self ($\alpha = .87$)

- IS1 I imagine myself using English for the things I want to do in the future.
- IS2 I imagine myself using English in my future career.
- IS3 I often imagine myself as someone who speaks English.
- IS4 I imagine myself using English effectively in the future.
- IS5 I imagine myself speaking English with international friends.

Interest in English-speaking Culture ($\alpha = .78$)

- IC1 I like watching dramas in English.
- IC2 I like listening to music in English.*
- IC3 I like English language fiction.
- IC4 I like English language web sites.
- IC5 I like English language non-fiction.

International Friendship Orientation ($\alpha = .91$)

- IF1 I want to find friends from English-speaking countries.
- IF2 I want to speak English with people from different countries.
- IF3 I want to visit English-speaking countries.
- IF4 I want to do a home stay in an English-speaking country.
- IF5 I want to live in an English-speaking country.
- IF6 I want to make friends with English-speaking foreigners in Japan.

Ought-to L2 Self ($\alpha = .78$)

- OS1 I should learn English to succeed in my study field.
- OS2 I need to be able to use English in the future.
- OS3 People that I respect think I should learn English.
- OS4 My parents expect me to learn English.
- OS5 I should learn how to communicate in English so that I can contribute to society.
- OS6 I should learn English to get good scores on English exams.
- OS7 I should learn English in order to graduate.

Perceived Social Values ($\alpha = .73$)

- SV1 People in my hometown think that learning English is worthwhile.
- SV2 Companies in Japan value workers who learn English.
- SV3 People in my country think that it is a good thing to learn English.
- SV4 My science and engineering teachers think it's important to learn English.
- SV5 My parents consider English an important school subject.

Perceived Speaking Competence ($\alpha = .87$)

- SC1 I can introduce myself in English during pair work with a classmate.
- SC2 I can talk about my activities in English during pair work with a classmate.
- SC3 I can give an English speech to a small group of my classmates.
- SC4 I can give an English presentation as part of a group in front of my class.
- SC5 I can give an individual speech in English in front of my class.

Probable L2 Self ($\alpha = .72$)

- PS1 I expect to use English in my chosen career.
- PS2 When I begin my career, I will continue to study English.
- PS3 After I'm done with school, I will visit English-speaking countries.
- PS4 After I'm done with school, I will have friends with whom I speak English.
- PS5 In my career, I will need to take English exams.

Speaking Anxiety ($\alpha = .80$)

- SA1 I'm worried about making mistakes while speaking English.
- SA2 I feel nervous when I can't express my opinion in English.
- SA3 I'm afraid that others will laugh if I speak English.*
- SA4 I can feel my heart pounding when it's my turn to speak English in a group.
- SA5 I feel tense when I have to speak English.

TOTAL REVISED QUESTIONNAIRE: **45 items**

* *Removed following preliminary analysis*