An Exploration of Technical Communication as an EFL Learning Motivational Intervention for Engineering Majors

Michael Johnson, Hamamatsu University School of Medicine, Japan

The Asian Conference on Education 2022
Official Conference Proceedings

Abstract
This study set out to examine the implications of using technical communication instructional materials as a motivational intervention for freshman Japanese engineering students learning English as a Foreign Language (EFL). As this particular segment of learners has been identified as being hesitant toward EFL instruction, a suite of technical communication materials was presented and examined as a possible means for promoting engagement in the EFL classroom with these learners. The study examined a sample of 76 (n=76) learners' impressions and attitudes towards a three-week unit of technical communication instructional materials. These attitudes and impressions were measured through a mixed-method questionnaire comprised of items and scales from Keller's (2010) Instructional Materials Motivational Survey (IMMS) and additional open-ended items. Results indicated a positive endorsement of attention, relevance, confidence and satisfaction variables associated with the materials. Open-ended items revealed a general overall enjoyment derived from the communicative tasks, and an interest with technical communication and technical content presented within the materials.

Keywords: ESP, EFL, Technical Communication, Japan, Engineering Majors, Engagement, Instructional Materials Evaluation

Introduction

Science and engineering students in Japan have been described as being less motivated English as foreign language (EFL) learners than tertiary learners in other academic majors (Johnson, 2012; Maekawa & Yashima, 2012; Nishizawa, Yoshioka, & Fukuda, 2010). Their reluctance towards English language learning has been attributed to the fact that foreign language (FL) classes are usually forced upon such learners in the form of undergraduate breadth requirements, and that FL classes are perceived to take time away from primary areas of study and interest (Johnson, 2013; Tsuchiya, 2006). Additionally, engineering majors in Japan have demonstrated relatively lower levels of success in standardized English tests than learners in most other academic majors (ETS, 2020). Considering these factors contributing to EFL learning hesitancy in this segment of learners, this study sought to examine if a particular curricular intervention could positively orient learners towards required EFL classes. More specifically, it sought to ascertain if the use of English for Specific (ESP) instructional materials oriented towards these learners' academic majors would engender greater feelings of interest and relevance toward English learning, and positively influence motivation, attitudes and engagement.

Instructional materials have been shown to play a significant role in classroom attitudes and engagement. This has been largely described in motivational and demotivational terms (Bahous, Bacha, & Nabhani, 2011; Gorham & Millette, 1997; Williams, Burden, & Al-Baharna, 2001), where instructional materials are seen to either facilitate or inhibit motivation in learners. In Nikolov's (2001) examination of language learners in Hungary, it was demonstrated that the layout features, qualitative aspects, and tasks contained within texts, influenced learners' degree of motivational engagement. Similarly, Ushioda (1996, 2001) revealed that Irish FL learners' motivation varied partly due to their perceived satisfaction, or dissatisfaction, with course materials; with coursework, tasks which exceeded lexical knowledge, and the gap between coursework and exam content, being shown to have demotivating effects on learners. Examining the influence of instructional materials on FL language learning from a different perspective, Matsumoto (2007) demonstrated that materials could be an important contributor to peak learning experiences. The study showed how authentic instructional materials that aligned with FL learners' interests contributed to a state of high affective and cognitive fulfilment or satisfaction with the learning experience. However, it was also revealed that materials could be a demotivating factor when not suitably aligned with learners' interests.

The motivational effect of particular types of instructional materials on language learners has also been observed in a number of studies. One particular area which has received attention is the specific attributes of authentic versus non-authentic instructional materials (Gilmore, 2007; Guariento & Morley, 2001; Richards, 2006). In an examination of South Korean tertiary EFL learners, Peacock (1997) observed that, while learners reported that they found authentic material to be less interesting than artificial materials, their observed on-task engagement and motivated behavior were significantly higher with authentic materials. Other instructional material types that have been empirically compared include paper-based versus web-based materials. Jarvis and Szymczyk's (2009) examination of web- and book-based grammar learning materials found that while students initially found the web-based materials attractive and interesting, they preferred book-based materials for their availability, clear organization, comprehensibility of presentation, detailed explanations of grammar points, systematic nature, and portability. They found the lack of organization and the distracting nature of website links to be particularly demotivating in autonomous grammar learning. In

another study presenting somewhat conflicting results, Henry (2007) found that ESP tertiary learners in Brunei embraced corpus-driven online materials. In particular, learners found that access to the discourse structures and lexico-grammatical features enabled them to access language data they perceived necessary for fulfilling their language learning goals.

These studies demonstrate that the content of instruction, particularly as it is conveyed through instructional materials, influences learner motivation in a variety of ways. However, the limited number and scope of these studies suggest that further research is needed to clarify the motivational effects of instructional materials on language learners across a broader spectrum of learning contexts. In order to expand upon the previous research, this study set out to examine the role of ESP technical communication (TC) instructional materials on the EFL learning motivation of tertiary engineering students. The following research questions have been developed to guide this inquiry.

Research Question 1: Do TC instructional materials promote engagement with Japanese engineering students learning EFL?

Research Question 2: What characteristics of TC instructional materials appeal to this segment of learners?

Methods and Materials

Participants

The participants in this study were all Japanese engineering students learning EFL at an engineering university in Japan. All were first year students enrolled in a mandatory Freshman General English class. This particular class represents the first of six English classes required as part of the liberal arts breadth requirements for the Bachelor of Engineering degree at this institution. The sample represents a convenience sample of students enrolled in the author's Freshman General English classes, and consisted of a total of seventy-six (n=76) participants. The sample was comprised of students majoring in mechanical engineering (n=39) and architecture (n=37).

Instructional Materials

A three-week unit of instruction was developed to introduce students to foundational topics in basic English for technical communication for freshman engineering students. The instructional materials utilized over the three-week unit covered three weekly topics: 1. talking about engineering studies and future careers, 2. numbers and specifications, and 3. materials and their characteristics. Each lesson focused on providing a lexical foundation for the topic, and involved a series of communicative tasks that enabled the students to use the language interactively with their classmates and teacher.

Data Collection: Instruments and Methods

The first section of the TC-IMMS was comprised of a questionnaire based on Keller's (2010) Instructional Materials Motivation Survey (IMMS) which measured the instructional materials' cognitive appeal to learners. The questionnaire was comprised of 36 Likert-scale items consisting of four scales examining separate cognitive variables associated with motivation. The first scale, Confidence (CON), was comprised of nine items measuring the

degree to which instructional materials promote self-efficacy in learners with a particular focus on the materials' perceived level of difficulty and comprehensibility. The second scale, Attention (ATT), was made up of twelve items assessing the degree to which the materials initiate and sustain learners' attention through content and design features. The third scale, Relevance (REL) was a nine-item scale measuring the degree to which learners perceived the materials to be of present or future value, or represent personal or professional utility value. Satisfaction (SAT), consisted of six items measuring the degree to which the materials fostered achievement motivation (feelings of accomplishment) and intrinsic motivation (particularly interest and enjoyment) in learners. The second part of the TC-IMMS was comprised of three open-ended items asking learners about their general impressions of the suite of TC instructional materials, which lessons they particularly liked, and why, and which lessons they did not like, and why. These questions were asked to reveal perspectives and insights not readily apparent in the scales described above, and to add further descriptive insight into the closed item responses.

The TC-IMMS was administered at the end of a three-week instructional session within which three ninety-minute technical communication classes were taught. A total of seventy-six (n=76) TC-IMMS forms were collected. Data from the collected TC-IMMS were input into SPSS v.26 for analysis and general descriptive statistics were calculated to obtain an overall picture of how the scales and specific items were endorsed. Open-ended items were analyzed using two-step content analysis by two raters (the author and a colleague), a process which involved first-round categorization into general themes, then a second-stage of further refinement into final response categories (as described in Saldana, 2009).

Results

Overall results indicated a positive endorsement of all scales from the IMMS-derived portion of the TC-IMMS. Attention and Satisfaction scales were particularly strongly endorsed with means over four (ATT m=4.15; SAT m=4.11), with Relevance and Confidence scales also demonstrating strong endorsement with a mean approaching four on the five-point scale (REL m=3.96; CON m=3.90).

Table 1: TC-IMMS scale summary

	N	*a*	m	min	max	range	variance	item#
CON	76	.72	3.90	3.48	4.21	.724	.075	9
ATT	76	.86	4.15	3.78	4.39	.605	.038	12
REL	76	.76	3.96	3.69	4.23	.539	.039	9
SAT	76	.76	4.11	3.35	4.73	1.38	.267	6

Individual item results are presented in Appendix 1. The highest endorsed individual items were SAT6 (m=4.74), SAT3 (M=4.59), ATT11 (4.39), ATT5 (4.37), ATT 3 (4.36). While the least endorsed item was from the Satisfaction scale (SAT4: M=3.36), four out of the five least endorsed items were from the Confidence scale (CON1: m=3.49; CON2: m=3.58; CON7: M=3.74; CON3: m=3.78).

The direction and strength of relationships between scales was investigated using Pearson product-moment correlation coefficient. Correlations between r =.50 to r =1.0 were observed between all scales (Table 3) which is indicative of a strong positive relationship (Cohen, 1988). These findings reflect positive correlational relationships between IMMS scales observed in other studies (Keller, 2010).

Table 2: Pearson product-moment correlation between TC-IMMS scales

	1	2	3	4
ATT	--	.668**	.527**	.741**
REL	--	--	.535**	.682**
CON	--	--	--	.519**
SAT	--	--	--	--

**correlation significant at the 00.1 level (2-tailed)

Open-ended items provided complementary insights into how the students felt about using the materials, which specific materials they liked and disliked, and why. Open-ended item 1 asked student how they felt about using the TC instructional materials. The most frequent responses (Table 3) fell into a nonspecific general positive endorsement category with students deriving enjoyment from using the materials (n=37) or general positive feelings of the materials being good, great or liked (N=20). The second most frequent category of response was a positive orientation toward the skills they entailed, specifically communicating in English (N=21) and the practical/useful nature of the skills practiced (n=8). The third most frequent response category was also positive, and included responses focused on the appeal to personal interest generated by the materials (n=21). The fourth category of response was a positive feeling toward the knowledge conveyed, with students indicating that through the materials they could learn new things (n=13), and could learn technical English (n=7). A fifth category was comprised of negative impressions of the materials which were attributed exclusively to their degree of difficulty (n=2).

Table 3: Open-ended item 1: Overall impressions of TC materials and cited reasons

Category 1: positive: nonspecific general positive endorsement

cited reasons	(***n***)
enjoyed	n=37
good/great/liked	n=20
total:	n=57

Category 2: positive: skills entailed

cited reasons	(***n***)
provided opportunity to communicate	n=21
practical/useful	n=8
total:	n=29

Category 3: positive: appeal to interest

cited reasons	(***n***)
materials were interesting	n=21
total:	n=21

Category 4: positive: knowledge conveyed

cited reasons	(***n***)
learned new things	n=13
could learn technical English	n=7
total:	n=20

Category 5: negative

cited reasons	(***n***)
difficult	n=2
total:	n=2

Open-ended item 2 asked students which lesson they liked most and why (Table 4). Lesson 3, which covered materials used in engineering and their physical properties and characteristics, was most preferred (n=48). The most significant reason for this was the high endorsement of the Mystery Item Quiz activity (n=28). This task involved students guessing their partner's "mystery item" through asking about its physical properties and characteristics using vocabulary and concepts learned in the lesson. Other reasons cited for this preference were an overall interest in the materials and engineering theme, the grounding of the theme in a specific topic that students liked (bicycles), and the highly interactive nature of the lesson. The second most preferred lesson was numbers and specifications. This lesson was positively endorsed due its practical value, interest in specification themselves, and interest in the various machines introduced in the lesson. The third most preferred lesson was Lesson 1, which introduced the language required to discuss engineering studies and future careers in engineering. Reasons cited for this preference were the engineering content, the opportunity to learn about famous Japanese engineers and their backgrounds, and the connection of the lesson content to students' future lives and careers. A number of students (n=6) responded that they liked all three lessons equally well, and had no particular preference.

A third open-ended item asked students if there were any particular lessons they did not like, and to explain reasons why they disliked particular lessons. Only three responses were provided with two students (n=2) replying that they did not like Lesson 2 due to the difficulty, and one student (n=1) stating that they did not like lesson three because they were not interested in the topic.

Table 4: Open-ended item 2: Lesson preferences and cited reasons

First preference	*n*	***Second preference***	*n*	***Third preference***	*n*
Lesson 3	48	Lesson 2	16	Lesson 1	7

Reasons cited	*n*	***Reasons cited***	*n*	***Reasons cited***	*n*
mystery item quiz	28	practical	9	topic (engineering)	2
interesting	7	specifications	7	famous engineers	2
topic (bicycles)	7	machines	2	future relevance	2
interaction	6				
materials	5				

Discussion

A recurring finding in language learning research in Japan is the presence of a demotivational arc in English learning that gradually declines over scholastic careers and reaches its nadir at the tertiary level (Berwick & Ross, 1989; Falout, Murphey, Fukuda, & Trovela; 2013; Ryan, 2009). This reticence to engage EFL learning is particularly pronounced in Japanese engineering students (Johnson, 2013; Maekawa & Yashima, 2012; Nishizawa, Yoshioka, & Fukuda, 2010; Tsuchiya, 2006). To address this situation, this study set out to test the efficacy of TC instructional materials as a motivational intervention to increase engagement of Japanese engineering students in the EFL classroom. The study provided and number of valuable insights that those tasked with instructing these students should consider when selecting materials and tasks for this segment of learners.

TC instructional materials attracted learner attention in a manner that initiated and sustained their attention. This was evident in the highly endorsed attention variable and also the responses to the open-ended items. Several students commented on how the TC instructional

materials drew them in and held their attention. Student A20 wrote "I learned content and words I didn't know, that was interesting. It attracted my attention with many things, like machines, to learn about them was interesting." Similarly, student A26 commented "It was really good. Engineering content was interesting and made me want to study." Dudley-Evans and St John (1998) explain that, to stimulate attention, ESP instructional materials "must contain concepts and/or knowledge that are familiar but must also offer something new, a reason to communicate, to get involved. The exploitation needs to match how the input would be used outside the learning situation and take account of language learning needs. The purpose and the connection to learners' reality need to be clear" (p. 172). The comments above indicate that the TC instructional materials in this lesson met these criteria. In promoting such engagement, the materials represented sufficient value to students to foster positive attitudes and persistent efforts in the classroom (Wigfield & Eccles, 2000).

Additionally, the high degree of satisfaction with the TC instructional materials indicated in the questionnaire results demonstrated that the learners were motivated intrinsically by the materials and the tasks required therein. The large number (n=57) of nonspecific general positive responses to the first open-ended item support a high level of overall satisfaction with the materials. Open-ended item responses such as "I feel fun every time. I can feel enjoyment studying English for the first time" (A1) and, "I enjoyed talking with others about "things" in English. I enjoyed it so much" (B11), indicate that students found intrinsic value in engaging in the tasks for their own sake. Intrinsically motivated classroom behaviors are those which are engaged in for the inherent interest, enjoyment and satisfaction they provide, and are internally driven (Deci & Ryan, 1985; Deci, Vallerand, Pelletier, and Ryan, 1991). Positively orienting instruction toward these intrinsic motives through TC instructional materials appears to coincide with Tomlinson's (2010) suggestion that a primary consideration in instructional materials design should be the degree to which they are engaged by learners.

The results of the questionnaire also indicated that students found that the TC materials had clear present or future personal or professional utility value. This was clear in both the strong endorsement of the relevance scale, and in open-item responses. Open-ended responses such as "There was a lot of useful and practical English in this class" (A8), and "It was interesting, I learned many important and useful things for my future" (A11), support an overall impression that many students found the TC materials relevant to their interests and future careers. These ideas were further supported in the responses to open-ended item 2, which asked students what lessons they liked and why. Many responded with specific references to the TC instructional materials being relevant to their specific interests, hobbies, and future careers. This relevance allows students to draw on both intrinsic and instrumental characteristics in appealing to both personal interests and careers. It also provides students with cultural schemata to be confident in the world of science and engineering (Alptekin, 1993). This is particularly important as in Japan a number of engineering jobs are becoming inexorably tied to English, particularly in IT, with English-speaking workers from around the world filling posts in Japanese engineering firms in recent years (Kopp 2019, Nagata 2018). This relevance is valuable as it can motivate students as they envision their future selves and engage in positive learning behaviors that will move them towards these desired future outcomes (Dornyei, 2009; Maekawa & Yashima 2012; Ueki & Takeuchi, 2013).

Another encouraging result was students' positive endorsement of the confidence scale. A number of studies have idenfied a lack of confidence or self-efficacy as a barrier for Japanese tertiary students learning EFL (Burden, 2002; Sakai & Kikuchi, 2009; Tsuchiya, 2006).

While some students initially found the English-medium TC class intimidating, their attitudes changed when they encountered the subject matter together with their classmates, as student A39 commented, “First, I felt oh no, only English. I thought it was difficult, but I could slowly understand with my friends, I have a great time in these classes.” Other students found just the opportunity to use English generated self-efficacy, as student A23 reflected, “It was really good. I could communicate with others. It was good having a chance to communicate and work with others, I could do it, I enjoyed it.” A limited amount of exposure and opportunity to use English has been shown to inhibit learner confidence in Japanese EFL education (Benson, 1991; Matsuda & Gobel, 2004). As Teeter (2017) and Maekawa and Yashima (2012) observe, the opportunity to actually practice the language can help reduce anxiety, and in this case, contribute to increased confidence in using English.

Conclusion

The TC instructional materials utilized in this study appeared to attract and sustain student attention, provide a high level of intrinsic satisfaction, appeal to present interests and future ambitions, and instill a sense of confidence in learners. These positive results suggest that IC instructional materials could serve as a possible motivational intervention to encourage engagement with Japanese engineering students learning EFL. A limitation that must be acknowledged is the limited scope of the technical communication course examined in this study. Piloting and examining a three-week technical communication course would likely render a different outcome than an extensive faculty-wide ESP program (such as that described in Guest, 2016). As such, the novelty appeal of the course may have been a factor contributing to the positive results. This limitation notwithstanding, the results of this study suggest that aligning EFL instruction with academic majors can appeal to learners on a variety of levels and promote engagement. Further research across other academic areas and contexts using other types of ESP materials is necessary to elucidate the extent to which instructional materials affect classroom engagement and attitudes toward foreign language instruction.

Appendix 1: TC-IMMS item summary

				item response frequency (%)					
n	M	SD	var.	1	2	3	4	5	
CON1	76	3.49	.97	.94	1.3	17.1	26.3	42.1	13.2
CON2	76	3.58	.80	.64	0	9.2	34.2	46.1	10.5
CON3	76	3.78	.90	.81	1.3	6.6	26.3	44.7	21.1
CON4	76	4.21	.80	.64	0	3.9	11.8	43.4	40.8
CON5	76	3.92	.84	.71	0	5.3	23.7	44.7	26.6
CON6	76	4.16	.73	.53	0	1.3	15.8	48.7	34.2
CON7	76	3.74	.85	.73	1.3	3.9	32.9	43.4	18.4
CON8	76	4.21	.69	.48	0	0	15.8	47.8	36.8
CON9	76	4.05	.79	.63	1.3	0	21.1	47.4	30.3
ATT1	76	3.92	.81	.66	0	7.9	13.2	57.9	21.1
ATT2	76	3.79	.89	.80	1.3	6.6	25	46	21
ATT3	76	4.36	.64	.41	0	0	9.2	46.1	44.7
ATT4	76	4.21	.71	.51	0	1.3	13.2	48.7	36.8
ATT5	76	4.37	.78	.60	3.9	5.3	42.1	47.4	1.3
ATT6	76	3.99	.79	.62	0	3.9	19.7	50	26.3
ATT7	76	4.17	.75	.57	0	2.6	13.2	48.7	35.5
ATT8	76	4.07	.69	.48	0	1.3	17.1	55.3	26.3
ATT9	76	4.12	.90	.82	0	6.6	15.8	36.8	40.8
ATT10	76	4.09	.69	.48	0	2.6	11.8	59.2	26.3
ATT11	76	4.39	.73	.53	0	1.3	10.5	35.5	52.6
REL1	76	3.71	.89	.79	0	11.8	22.4	48.7	17.1
REL2	76	4.03	.67	.45	0	0	21.1	55.3	23.7
REL3	76	4.22	.72	.52	0	1.3	13.2	47.4	38.2
REL4	76	3.96	.80	.65	0	3.9	22.4	47.4	26.3
REL5	76	3.89	.94	.89	0	9.2	22.4	38.2	30.3
REL6	76	4.05	.69	.47	0	1.3	17.1	56.6	25
REL7	76	3.84	.83	.69	0	6.6	23.7	48.7	21.1
REL8	76	3.70	.88	.77	2.6	5.3	26.3	51.3	14.5
REL9	76	4.24	.74	.55	0	2.6	10.5	47.4	39.5
SAT1	76	3.92	.87	.76	0	6.6	22.4	43.4	27.6
SAT2	76	3.82	.92	.84	1.3	5.3	28.9	39.5	25
SAT3	76	4.59	.57	.32	0	0	3.9	32.9	63.2
SAT4	76	3.36	.96	.92	3.9	10.5	43.4	30.3	11.8
SAT5	76	4.24	.67	.45	0	0	13.2	50	36.8
SAT6	76	4.74	.55	.30	0	0	5.3	15.8	78.9

References

Alptekin, C. (1993). Target-language culture in EFL materials. *ELT Journal*, *47*(2), 136-143.

Bahous, R., Bacha, N. & Nabhani, M. (2011). Motivation students in the EFL classroom: A case study of perspectives. *English Language Teaching*, *4*(3), 33-43.

Benson, M. (1991). Attitudes and motivation towards English: A survey of Japanese Freshmen. *RELC Journal, 22*, 34-48.

Berwick, R., & Ross, S. (1989). Motivation after matriculation: Are Japanese learners of English still alive after exam hell? *JALT Journal, 11*(Nov.), 193-210.

Burden, P. (2002). A cross sectional study of attitudes and manifestations of apathy of university students towards studying English. *The Language Teacher, 26*(3), 3-10.

Deci, E. L., & Ryan, R. J. (1985). *Intrinsic motivation and self-determination in human behavior* New York: Plenum.

Deci, E. L., Vallerand, R. J., Pelletier, R. J., & Ryan, R. J. (1991). Motivation and education: The Self-Determination perspective. *Educational Psychologist, 26*(3&4), 325-346.

Dornyei, Z. (2009). The L2 motivational self system. In Z. Dornyei & E. Ushioda (Eds.), Motivation, language identity and the L2 self (pp. 9-42).Bristol: Multilingual Matters.

Dudley-Evans, T. & St. John, M. (1998). Developments in English for Specific Purposes: A multi-disciplinary approach. Cambridge: Cambridge University Press.

ETS (2020) TOEIC Program: Data & Analysis 2020: ETS:TOEIC: IIBC: Tokyo https://www.iibc-global.org/library/default/iibc/press/2020/p155/pdf/2020DAA.pdf

Falout, J., Murphey, T. Fukuda, T. and Trovela, M. (2013). Japanese EFL leaners remotivation strategies. In M. Cortazzi & J. Lixian (eds.) Researching cultures of leaning: International perspectives on language leaning and education pp 328-349. Basingstroke, Palgrave Macmillan.

Gilmore, A. (2007). Authentic materials and authenticity in foreign language learning. *Language Teaching, 40*, 97-118.

Gorham, J., & Millette, D. (1997). A comparative analysis of teacher and student perceptions of sources of motivation and demotivation in college classes. *Communication Education, 46*, 245-261.

Guariento, W., & Morley, J. (2001). Test and task authenticity in the EFL classroom. *ELT Journal, 55*(4), 347-353.

Guest, M. (2016) Overcoming Institutional Barriers to Establishing an ESP Programme: A Case Report from Japan. *Asian ESP Journal*, *12*(3) 7 – 24.

Henry, A. (2007). Evaluating learners' response to web-based, data driven, genre teaching materials. *English for Specific Purposes, 26*, 462-484.

Jarvis, H., & Szymczyk, M. (2009). Student views on learning grammar with web- and book-based materials. *ELT Journal, 64*(1), 32-44.

Johnson, M.P. (2012) Examining EFL Motivation in Japanese Engineering Students. *Asian ESP Journal*, *8*(2) 79-102.

Johnson, M.P. (2013). A longitudinal perspective on EFL learning motivation in Japanese engineering students. In M. Apple, D. DaSilva, & T. Fellner (Eds.), *Language learning motivation in Japan* (pp. 189-205). Bristol: Multilingual Matters.

Keller, J.M. (2010). *Motivational design for learning and performance: The ARCS Model Approach*. New York: Springer.

Kopp, K. (2019). Demand for non-Japanese engineers is growing, but know what you're in for before you apply. Jan, 30. *The Japan Times*. https://www.japantimes.co.jp/community/2019/01/30/how-tos/demand-non-japanese-engineers-growing-know-youre-apply/

Maekawa, Y. and Yashima, T. (2012). Examining the effects of presentation-based instruction on Japanese engineering students' attitudes towards learning English: A preliminary study. JACET Kansai Journal, *14*, 17-28.

Matsuda, S., & Gobel, P. (2004). Anxiety and predictors of performance in the foreign language classroom. *System, 32*, 21-36.

Matsumoto, H. (2007). Peak learning experiences and language learning: A study of American learners of Japanese. *Language, Culture and Curriculum, 20*(3), 195-208.

Mishan, F. & Timmis, I. (2015) Materials development for TESOL. Edinburgh: Edinburgh University Press.

Nagata, K. (2018). Japan's IT firms enthusiastically open doors to overseas tech workers. The Japan Times. Nov. 18, 2018. https://www.japantimes.co.jp/news/2018/11/18/business/japans-firms-enthusiastically-open-doors-overseas-tech-workers/

Nikolov, M. (2001). A study of unsuccessful language learners. In Z. Dörnyei & R. Schmidt (Eds.), *Motivation and Second Language Acquisition* (pp.149-169). Honolulu: University of Hawai'i.

Nishizawa, H., Yoshioka, T. & Fukada, M. (2010). The impact of a 4-year extensive reading program. In A. M. Stoke (Ed.), *JALT2009 Conference Proceedings*. Tokyo: JALT.

Peacock, M. (1997). The effects of authentic materials on the motivation of EFL learners. *ELT Journal, 51*(22), 144-156.

Richards, J. (2006). Materials development and research--Making the connection. *RELC Journal, 37*(1), 5-26.

Ryan, S. (2009) Ambivalence and commitment, liberation and challenge: Investigating the attitudes of young Japanese people towards the learning of English. Journal of Multilingual and Multicultural Development, 30(5), 405–420.

Sakai, H., & Kikuchi, K. (2009). An analysis of demotivators in the EFL classroom. *System, 37*, 57-69.

Saldana, J. (2009). *The coding manual for qualitative researchers*. London: Sage.

Tanaka, M. (2017). Examining EFL vocabulary learning motivation in a demotivating learning environment. *System*, *65*, 130-138.

Teeter, J. (2017). Improving motivation to lean English in Japan with a self-study shadowing application. *Languages*. *2*(19), 1-27.

Tomlinson, B. (2010). Engaged to learn – ways of engaging ESL learners. *Advances in Language and Literacy studies. 1*(1) 29-55.

Tsuchiya, M. (2006). Profiling of lower achievement English learners at college in terms of demotivating factors. *Annual Review of English Language Education in Japan 17*, 171-180.

Tsuchiya, M. (2010). The effects of participatory English classes on he motivation of science students learning English. *Journal of JSEE*. *58*(3) 44-56.

Ueki, M., & Takeuchi, O. (2013). Forming a clearer image of the ideal L2 self: the L2 motivational self system and learner autonomy in a Japanese EFL context, *Innovation in Language Learning and Teaching*, *7*(3), 238-252.

Ushioda, E. (1996). Developing a dynamic concept of motivation. In T. Hickey & J. Williams (Eds.), *Language, education and society in a changing world* (pp. 239-245). Dublin: IRAAL/Multilingual Matters.

Ushioda, E. (2001). Language learning at university: Exploring the role of motivational thinking. In Z. Dörnyei & R. Schmidt (Eds.), *Motivation and second language education* (pp. 93-125). Honolulu: University of Hawaii Press.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value of achievement motivation. *Contemporary Educational Psychology, 25*, 68-81.

Williams, M., Burden, R. L., & Al-Baharna, S. (2001). Making sense of success and failure: The role of the individual in motivation theory In Z. Dörnyei & R. Schmidt (Eds.), *Motivation and second language education* (pp. 171-184). Honolulu: University of Hawai'i Press.