

## L2 Learners' Motivation for Learning English in Computer-Mediated Communication Activities

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### Abstract

This study investigated students' motivation for learning English in computer-mediated communication (CMC) activities provided for tertiary-level English courses by means of a questionnaire survey guided by Self-Determination Theory (SDT; Deci & Ryan, 1985). The purpose of this study was two-fold: (1) to elucidate the types of students' motivational predispositions toward the CMC activities, and (2) to examine the motivational differences among 21 different English courses, especially focusing on the effect of course types (i.e., *elective* vs. *compulsory* courses). The questionnaire used in this study was developed on the basis of the Language Learning Orientations Scale (Noels, Pelletier, Clement & Vallerand, 2000). The participants were 365 Japanese university students enrolled in the target CMC activities as a part of their classroom activities or extra-curricular activities. The results showed that the students' motivational predispositions could be roughly divided into three types: (1) predisposition toward autonomous learners, (2) predisposition toward externally regulated learners and (3) *Others*. The results also indicated that the students in the elective English courses were predisposed to be autonomous learners, whereas those in the compulsory courses were predisposed to be externally regulated learners as found in our previous surveys.

### Keywords

L2 Motivation, Intrinsic Motivation, Extrinsic Motivation, Amotivation, Self-Regulation, Distance Learning, Computer-Mediated Communication

### 1 Introduction

Since 2008, we have conducted a longitudinal study to investigate students' motivation for learning English in the context of computer-mediated communication (CMC) activities (Nakano & Yoshida, 2008; Nakano, Yoshida, & Owada, 2008; Yoshida, 2010; Yoshida & Nakano, 2009, 2010, 2011). The activities, called Cross-Cultural Distance Learning (CCDL) CMC activities, have been provided as one of the classroom or extra-curricular learning activities for tertiary-level English courses relevant to a distance learning program called CCDL program. The primary aims of our longitudinal study were (1) to evaluate the effectiveness of CCDL program in terms of the participating students' motivation toward the CMC activities, and (2) to discuss the ideal learning environments that are thought to enhance the students' motivation toward the activities (e.g., Yoshida & Nakano, 2011). To address these motivational issues, we employed theoretical framework of Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000b, 2002; for details, see section 2) and tested our research hypothesis that students' motivation will be more satisfactory if they opt to join the activities whereas their motivation will be less if they are forced to do so (Nakano, 2006), by means of questionnaire surveys. As a result, we found that the students in elective CCDL courses (i.e., those who opted to join the activities) were likely to be autonomously motivated to join the CMC activities, whereas the students in obligatory CCDL courses (i.e., those who were forced to join the activities) were likely to be externally regulated, and thus, demotivated to do so. These findings provided supportive evidence on our research hypothesis, suggesting the applicability of SDT framework to the research on the motivational issues in the context of CCDL CMC activities.

On the basis of the findings in our previous surveys, the present study aimed to further discuss the motivational issues among 21 different CCDL courses from the perspective of SDT. The purpose of this study was two-fold: (1) to elucidate the types of students' motivational predispositions toward the CMC activities and (2) to examine the motivational differences, especially focusing on the effect of course types, that is, *elective* versus *compulsory* courses, as in our previous surveys.

## 2 Self-Determination Theory

SDT is a motivation theory developed in the field of psychology (Deci & Ryan, 1985; Ryan & Deci, 2000b, 2002). Because of its comprehensive perspective on human motivation, the theory has been applied to various research fields, including the field of education (Deci et al., 1991; Reeve, 2002; Vallerand & Bissonnette, 1992), and second language acquisition (Noels, 2001a, 2001b, Noels et al., 2000; Park, 2006; see also Dörnyei, 1994). The theory conceptualized three types of motivation called *intrinsic motivation*, *extrinsic motivation* and *amotivation*, each of which was assumed to be relating each other along with the self-determination continuum (Deci & Ryan, 1985) as in Figure 1. The following sections briefly summarize each of the three types of motivation.

Behavior	Nonself-determined				Self-determined		
Type of Motivation	Amotivation	Extrinsic Motivation				Intrinsic Motivation	
Type of Regulation	Non-Regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation	
Locus of Causality	impersonal	External	Somewhat External	Somewhat Internal	Internal	Internal	

Figure 1: The self-determination continuum (as cited in Deci & Ryan, 2000, p.237)

### 2.1 Intrinsic Motivation

SDT defined *intrinsic motivation* as a fully autonomous type of motivation with a “prototypical form of self-determination” (Deci & Ryan, 1991, p.253); thus, this type of motivation is placed on the extreme, *Self-determined side*. SDT further elucidated the feature of intrinsic motivation in terms of the following exemplification; if one is intrinsically motivated toward a certain activity, he or she is expected to engage in it “with a full sense of choice, with the experience of doing what one wants, and without the feeling of coercion or compulsion” (p.253). In other words, intrinsically motivated behaviors can be said to be fully endorsed by one’s own *self*, and thus, fully self-determined (Deci & Ryan, 1985; 1991). It is also important to note that previous studies conceptualized three subtypes of intrinsic motivation on the basis of hypothesized triggers to enhance the sense of choice or self-determination; they are intrinsic motivation for knowledge, intrinsic motivation for accomplishment and intrinsic motivation for stimulation (for details, see Noels et al., 2000; Vallerand, Pelletier, Blais, Briere, Senecal, & Vallieres, 1992; Vallerand, Pelletie, Blais, Briere, Senecal, & Vallieres, 1993)

### 2.2 Extrinsic Motivation

SDT has discussed *extrinsic motivation* in terms of the four subtypes: *external regulation*, *introjected regulation*, *identified regulation* and *integrated regulation* (see Figure 1). These four types were categorized on the basis of the quality or amount of *internalization process*, a hypothesized psychological process where people actively transform their behavioral regulations from externally forced regulation to self-regulation that is endorsed by the self (Deci et al. 1991; Rigby, Deci, Patrick, & Ryan, 1992; Deci, Ryan & Williams, 1996; Ryan & Deci, 2000a, 2002). In other words, perceived sense of self-determination accompanying each of the four types was assumed to increase from *external regulation* to *integrated regulation* (Deci & Ryan, 2000; Ryan & Deci, 2000a).

### 2.3 Amotivation

SDT conceptualized *amotivation*, a type of motivation representing the lack of self-determination as well as motivation (Deci & Ryan, 2000). It is also important to note that the conceptual boundary between amotivation and extrinsic motivation illustrated in Figure 1 indicates that *amotivation* is not associated with one’s intentionality with respect to a given activity (Deci & Ryan, 1991). Therefore, the resulting behavior can be regarded as non-self-determined.

## 3 Method

### 3.1 Questionnaire

The questionnaire used in this study contained 24 items which were developed on the basis of those in the Language Learning Orientations Scale (LLOS: Noels et al., 2000; see also Park, 2006; Yoshida & Nakano,

2011). These 24 items were designed to be one of the possible reasons for studying English in the CMC activities and can be categorized into the following seven subscales (Information in the parentheses represents the abbreviations for each of the seven subscales and the number of the items included, respectively.)

- Intrinsic Motivation for Knowledge (IMK: 3 items)
- Intrinsic Motivation for Accomplishment (IMA: 3 items)
- Intrinsic Motivation for Stimulation (IMS: 3 items)
- Extrinsic Motivation-Identified Regulation (EMID: 4 items)
- Extrinsic Motivation-Introjected Regulation (EMINTRO: 4 items)
- Extrinsic Motivation-External Regulation (EMEX: 4 items)
- Amotivation (AMOT: 3 items)

In responding to the items, the students were asked to indicate to what extent each of the 24 reasons corresponded to one of the reasons why they study English in the activities, using 5-point Likert scale.

### 3.2 Participants

Participants in this study were 365 Japanese university students<sup>1</sup>. These students were enrolled in one of 21 CCDL English courses where the target CMC activities were introduced as one of the classroom or extra-curricular learning activities. Table 1 summarizes the information on each of the 21 courses, including course types (i.e., elective vs. compulsory) and the number of participating students.

Table 1: Summary of 21 CCDL courses

Class	Course Types	<i>n</i>
Class1	COMP	27
Class2	ELEC	13
Class3	ELEC	14
Class4	COMP	9
Class5	COMP	4
Class6	COMP	9
Class7	COMP	13
Class8	COMP	19
Class9	COMP	15
Class10	COMP	11
Class11	COMP	9
Class12	COMP	20
Class13	COMP	32
Class14	COMP	27
Class15	COMP	23
Class16	COMP	27
Class17	COMP	27
Class18	COMP	25
Class19	ELEC	19
Class20	ELEC	8
Class21	ELEC	14

Note: COMP and ELEC in the column named Course Types stand for *compulsory* and *elective*, respectively.

### 3.3 Analytic Procedure

First, we checked descriptive statistics for the 24 items in our questionnaire. Second, we conducted exploratory factor analysis (EFA) on the data. In EFA, we employed Maximum Likelihood method followed by Promax rotation for factor extraction, referred to *Kaiser's criterion* as well as the results of *test of goodness of fit* in determining the number of factors to be extracted, and regarded factor loadings of above |0.35| as meaningful in discussing the internal structures of factors extracted. Third, we computed individual factor scores in terms of Regression Method and then, averaged the scores for each of 21 different classes.

<sup>1</sup> Those who did not answer more than 3 items on the questionnaire were excluded from the analysis.

Lastly, screening each of the mean factor scores among the 21 classes, we discussed the types of motivational predisposition as well as motivational differences.

## 4 Results and Discussion

### 4.1 Descriptive Statistics

Table 2 shows descriptive statistics for 24 questionnaire items.

Table 2: Descriptive statistics for 24 items

Item	Label	<i>M</i>	<i>SD</i>	<i>M+1SD</i>	<i>M-1SD</i>
item1	IMA3	3.03	1.06	4.10	1.97
item2	EMID4	3.38	1.13	4.50	2.25
item3	IMS3	3.53	1.14	4.67	2.38
item4	EMEX4	2.11	1.11	3.22	1.00
item5	IMK1	3.78	1.04	4.82	2.74
item6	EMID3	3.59	1.12	4.71	2.47
item7	EMINTRO4	2.18	1.13	3.32	1.05
item8	EMEX3	2.91	1.19	4.10	1.72
item9	IMK2	3.72	1.06	4.78	2.66
item10	EMEX2	3.07	1.24	4.31	1.83
item11	IMA2	3.02	1.15	4.17	1.87
item12	AMOT3	2.18	1.14	3.32	1.04
item13	AMOT1	1.98	1.12	3.10	0.87
item14	EMINTRO3	2.49	1.09	3.59	1.40
item15	IMA1	3.26	1.06	4.32	2.21
item16	IMS1	2.96	1.12	4.08	1.85
item17	EMID2	3.56	1.12	4.68	2.43
item18	IMS2	3.35	1.15	4.50	2.20
item19	EMID1	3.63	1.10	4.74	2.53
item20	EMINTRO2	2.87	1.09	3.95	1.78
item21	AMOT2	1.77	1.05	2.82	0.72
item22	IMK3	3.77	1.11	4.88	2.66
item23	EMEX1	2.26	1.26	3.52	0.99
item24	EMINTRO1	2.46	1.11	3.58	1.35

Note: The column named Label shows the subscale and the individual item number within the subscales.

Although the resulting values of mean minus 1 standard deviation (i.e., M-1SD) indicated that floor effect might occur in Items 13, 21 and 23, we decided to retain them and discussed whether they could cause some negative effect in the process of EFA.

### 4.2 Results of EFA

As a result of EFA, we extracted 6 factors,  $\chi^2 = 199.53$ ,  $df = 114$ ,  $p < .001^2$ . Table 3 shows the resulting pattern matrix. According to each of the componential items, we named 6 extracted factors as follows.

- Factor 1: Motivation for Accomplishment<sup>3</sup>
- Factor 2: Autonomous Motivation for Knowledge
- Factor 3: Motivational Transition from External Regulation to Introjected Regulation
- Factor 4: Amotivation (AMOT)
- Factor 5: Extrinsic Motivation- Introjected Regulation (EMINTRO)
- Factor 6: Intrinsic Motivation for Stimulation (IMS)

The resulting 6 factors were said to be almost congruent with those found in our previous surveys (Nakano & Yoshida, 2008; Yoshida, 2009; Yoshida & Nakano, 2009, 2010, 2011). This result suggested the replicability as well as stability of the internal structures of *motivation construct* to be assessed by the questionnaire.

<sup>2</sup> Although the results of test of goodness of fit indicated that there might be more latent factors to be extracted, we stopped the analysis at this stage because further extraction was found to cause Heywood case.

<sup>3</sup> As in our previous surveys (Nakano & Yoshida, 2008; Yoshida, 2009; Yoshida & Nakano, 2009, 2010, 2011), we refrained from using the term “intrinsic” in naming Factor 1 because it contained some EM items that potentially reflected some *instrumentality* with respect to one’s engagement to the target activities (Deci et al., 1991).

Table 3: Pattern matrix

Label	Factors					
	1	2	3	4	5	6
EMID4	<b>.862</b>	.006	.056	-.016	-.003	-.249
IMA2	<b>.778</b>	-.036	.073	.086	-.162	.193
EMEX2	<b>.704</b>	-.072	-.014	.010	.084	.007
IMA3	<b>.637</b>	-.068	.022	-.029	-.010	.130
IMA1	<b>.528</b>	.004	-.020	.015	.113	.200
IMK2	-.002	<b>.967</b>	.112	.035	-.027	-.081
IMK1	-.050	<b>.963</b>	.063	.036	-.008	-.134
IMK3	-.106	<b>.790</b>	-.045	.135	-.084	.168
EMID2	.161	<b>.448</b>	-.082	-.100	.134	.158
EMID3	<b>.365</b>	<b>.447</b>	-.056	-.043	.063	-.007
IMS3	<b>.375</b>	<b>.393</b>	-.023	-.039	.002	.044
EMINTRO4	-.043	-.001	<b>.827</b>	-.087	.143	.016
EMEX4	-.079	.027	<b>.735</b>	.072	-.067	.075
EMEX3	.185	.127	<b>.646</b>	-.070	-.092	-.016
EMEX1	-.034	-.136	<b>.545</b>	.129	-.001	-.009
AMOT1	.070	.035	-.089	<b>.947</b>	-.012	.019
AMOT3	-.051	.125	-.014	<b>.806</b>	.060	.001
AMOT2	.034	-.040	.217	<b>.522</b>	.087	-.014
EMINTRO2	.018	-.010	.022	-.103	<b>.776</b>	-.028
EMINTRO3	-.013	-.053	-.040	.251	<b>.661</b>	.015
IMS1	<b>.406</b>	-.079	.030	.096	-.038	<b>.637</b>
IMS2	.099	.243	.028	-.175	.058	<b>.499</b>
% of variance	35.054	11.229	4.094	3.410	2.426	1.969

Note: Factor loadings of above |0.35| were highlighted in boldfaced type.

Table 4 shows the resulting inter-correlations among the 6 factors. In this matrix, all the 6 factors are ordered along with the self-determination continuum, so that, from left to right, both the degree of self-determination and the amount of motivation are expected to increase as hypothesized in SDT. The values in diagonal elements are Cronbach's alpha reliability coefficient computed for each of the 6 factors.

Table 4: Correlation matrix among 6 factors

	AMOT (Factor4)	EMEX to EMINTRO (Factor3)	EMINTRO (Factor5)	Accomplishm ent (Factor1)	AM for Knowledge (Factor2)	IMS (Factor6)
AMOT	(.812)	0.65	0.01	-0.54	-0.53	-0.22
EMEX to EMINTRO		(.770)	0.02	-0.39	-0.48	-0.18
EMINTRO			(.647)	0.46	0.39	0.42
Accomplishment				(.885)	0.72	0.52
AM for Knowledge					(.903)	0.54
IMS						(.764)

Note: EMEX to EMINTRO, Accomplishment, AM for Knowledge in the matrix stand for Motivational transition from EMEX to EMINTRO, Motivation for Accomplishment, Autonomous Motivation for Knowledge, respectively.

As in Table 4, the inter-correlations were found to be quasi-simplex pattern, which can be regarded as a reflection of the self-determination continuum (Deci & Ryan, 2000). This result provided a piece of evidence with respect to construct validity of our questionnaire.

### 4.3 Motivational Predispositions

In order to examine the types of students' predisposition toward the CMC activities, we computed averaged factor scores for the 21 CCDL English courses. Table 5 summarizes the results.

Table 5: Mean factor scores for 21 English courses

Class	Course Types	Mean Factor Scores					
		Factor 4 AMOT	Factor 3 EMEX to EMINTRO	Factor 5 EMINTRO	Factor 1 Accomplish- ment	Factor 2 AM for Knowledge	Factor 6 IMS
Class1	COMP	0.06	0.17	0.11	-0.13	-0.11	0.05
Class2	ELEC	-0.31	-0.32	0.35	0.68	0.54	0.44
Class3	ELEC	-0.54	-0.46	0.74	1.00	0.76	0.51
Class4	COMP	0.42	0.54	-0.40	-0.65	-0.92	-0.62
Class5	COMP	-0.25	0.19	0.53	0.16	0.31	0.58
Class6	COMP	0.36	-0.01	-0.13	-0.46	-0.69	-0.39
Class7	COMP	0.55	0.47	-0.49	-0.88	-0.59	-0.39
Class8	COMP	0.75	0.22	-0.04	-0.61	-0.24	-0.31
Class9	COMP	-0.55	-0.71	0.09	0.73	0.82	0.38
Class10	COMP	-0.82	-0.68	0.54	0.50	0.80	0.29
Class11	COMP	-0.67	-0.59	0.19	0.23	0.78	0.20
Class12	COMP	0.36	-0.04	0.24	-0.18	-0.18	-0.07
Class13	COMP	-0.10	-0.13	-0.33	-0.04	-0.26	-0.38
Class14	COMP	0.34	0.30	-0.13	-0.30	-0.42	0.04
Class15	COMP	0.45	0.58	0.05	-0.23	-0.17	0.14
Class16	COMP	-0.06	0.07	-0.18	0.05	-0.12	-0.27
Class17	COMP	-0.18	0.01	-0.26	0.15	0.01	-0.11
Class18	COMP	0.53	0.73	-0.12	-0.38	-0.29	-0.13
Class19	ELEC	-0.85	-0.83	-0.15	0.42	0.69	0.30
Class20	ELEC	-0.46	-0.58	-0.04	0.55	0.44	0.30
Class21	ELEC	-0.33	-0.22	0.65	0.33	0.25	0.55

Note: COMP and ELEC in the column named Course Types stand for *compulsory* and *elective*, respectively. All the 6 factors are ordered along with self-determination continuum (Deci & Ryan, 2000). Figures representing each of the 21 courses are shown in Appendix.

The results in Table 5 suggested that, among the 21 courses, the students' motivational predisposition can be roughly divided into the following three types (see also Figures 5-25 in Appendix).

- (1) Predisposition toward autonomous learners: Mean factor scores on *autonomous types of motivation* (Factors 1, 2, and 6) were higher than 0 (i.e., the grand mean), whereas the scores on *controlled types of motivation* (Factor 3 and 4) were lower than 0.
- (2) Predisposition toward externally regulated learners: Mean factor scores on controlled types of motivation (Factors 3 and 4) were higher than 0 (i.e., the grand mean), whereas the scores on autonomous types of motivation (Factors 1, 2, and 6) were lower than 0.
- (3) *Others*: Mean factor scores on the 6 factors were found to be almost equal to 0 (i.e., the grand mean).

On the basis of the above three types, we can categorize the 21 courses into 3 Class Types as follows.

Class Type (1): On average, the students were predisposed toward autonomous learners. Classes 2, 3, 5, 9, 10, 11, 19, 20 and 21 belong to this type.

Class Type (2): On average, the students were predisposed toward externally regulated learners. Classes 4, 6, 7, 8, 12, 14, 15 and 18 belong to this type.

Class Type (3): There must be each of the three types of students discussed above. Classes 1, 13, 16 and 17 belong to this type<sup>4</sup>.

<sup>4</sup> A fact that relatively large number of the students participated in the classes might be one of the possible reason to cause this result.

On the basis of three class types, we recomputed the mean factor scores. Table 6 summarizes the results.

Table 6: Mean factor scores computed for Class Types (1) (2) and (3)

Class Types	<i>n</i>	AMOT (Factor 4)	EMEX to EMINTRO (Factor 3)	EMINTRO (Factor 5)	Accomplish- ment (Factor 1)	AM for Knowledge (Factor 2)	IMS (Factor 6)
Class Type (1)	107	-0.564	-0.531	0.299	0.552	0.627	0.390
Class Type (2)	145	0.471	0.372	-0.087	-0.412	-0.364	-0.141
Class Type (3)	113	-0.071	0.025	-0.172	0.006	-0.127	-0.188

*Note:* EMEX to EMINTRO, Accomplishment, AM for Knowledge in the matrix stand for Motivational transition from EMEX to EMINTRO, Motivation for Accomplishment, Autonomous Motivation for Knowledge, respectively.

Figures 2-4 represent the graphs of the results in Table 6.

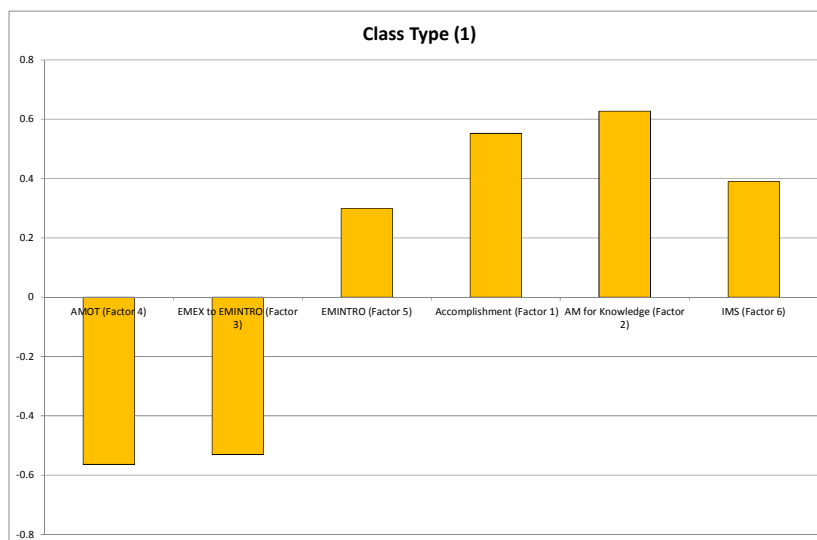


Figure 2: Mean factor scores for Class Type (1)

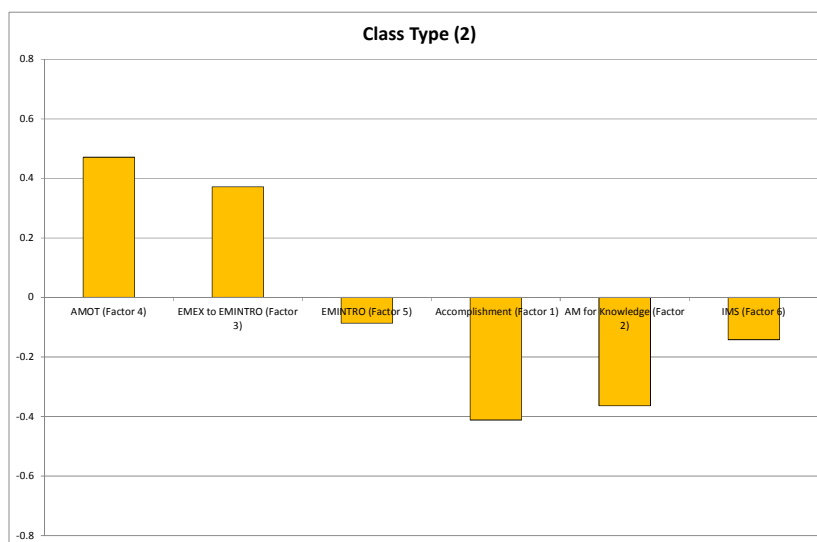


Figure 3: Mean factor scores for Class Type (2)

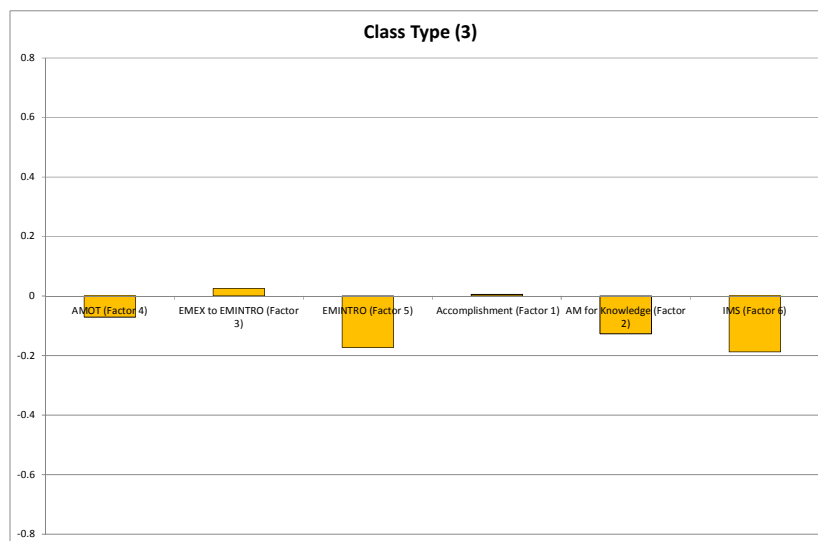


Figure 4: Mean factor scores for Class Type (3)

As Figures 2-4 show, each of the outstanding features as well as the apparent differences among the 3 Class Types still remained in the recomputed mean factors scores. The result provided a piece of supportive evidence on our classification of the students' motivational predispositions.

#### 4.4 Class Comparison Between Elective Courses and Compulsory Courses

To compare the motivational differences between elective courses and compulsory courses, we summarized a contingency table as in Table 7.

Table 7: Contingency table between elective classes vs. compulsory and 3 Class Types

	Class Type (1)	Class Type (2)	Class Type (3)	Total
COMP	4	8	4	16
ELEC	5	0	0	5
	9	8	4	21

Table 7 shows that all the elective courses were categorized into Class Type (1). This result suggested that the students in elective courses were predisposed to be autonomous learners. On the other hand, as we expected on the basis of our previous surveys, 8 out of the 12 compulsory courses were categorized into Class Type (2), suggesting that the students in compulsory courses were likely to be externally regulated learners. These results were congruent with those in our pilot surveys (e.g., Yoshida & Nakano, 2010).

It is also important to note that 4 out of 15 compulsory courses were categorized not into Class Type (2), but into Class Type (1). One of the potential reasons behind this exceptional result can be found in a fact that 3 out of the 4 courses were conducted by the same teacher, who must be *autonomy supportive* rather than *controlling* (Reeve, 2002; Yoshida & Nakano, 2010). Along with the notions in SDT, the result implies that, as an environmental factor, *teaching style of teacher* can be one of the good predictors of the students' motivational predispositions. On the other hand, however, although Classes 4 and 5 were both compulsory courses and conducted by the same teacher, Class 4 was categorized into Class Type (2) whereas Class 5 into Class Type (1). The result suggested that it is necessary to examine how teaching style of teacher exerts the effects on the students' motivation and to investigate the existence of other environmental factors such as *differences in students' fundamental reason for learning English*.

## 5 Summary

To sum up the findings in this study, we found that the students' motivational predispositions can be roughly divided into three types: (1) predisposition toward autonomous learners, (2) predisposition toward externally regulated learner, and (3) *Others*. The results also indicated that the students in the elective CCDL courses were predisposed to be autonomous learners, whereas those in the compulsory CCDL courses were predisposed to be externally regulated learners as found in our pilot surveys (e.g., Yoshida, 2010).

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### Appendix

Mean factor scores for Classes 1-21. Numbers ①② and ③ represent Class Types (1), (2) and (3) respectively.

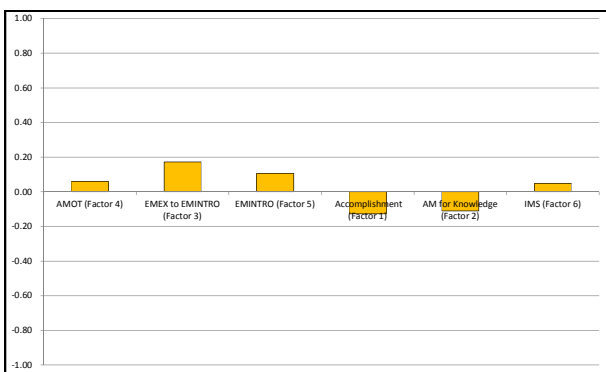


Figure 5: Class 1 (n = 27) ③

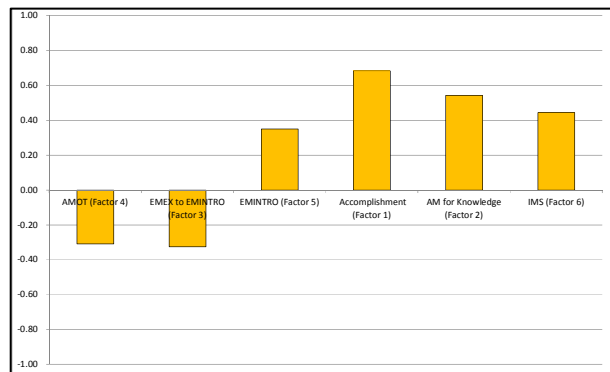


Figure 6: Class 2 (n = 13) ①

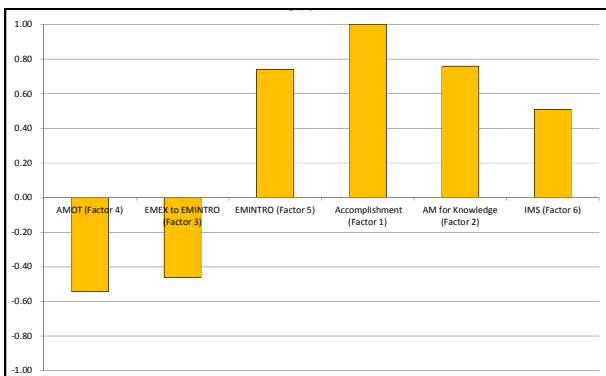


Figure 7: Class 3 (n = 14) ①

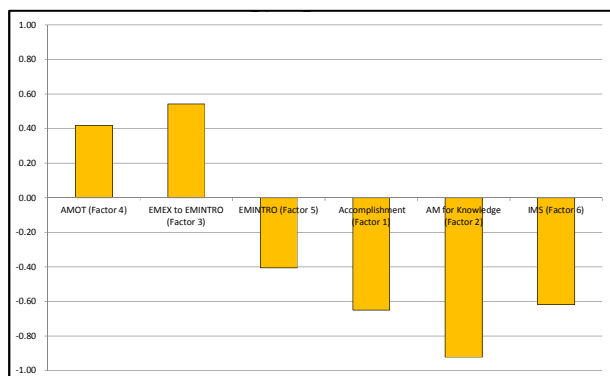


Figure 8: Class 4 (n = 9) ②

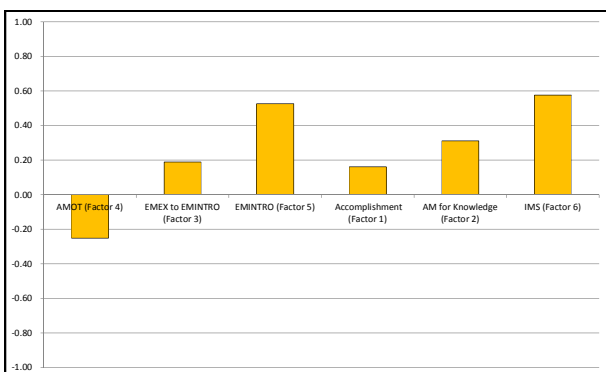


Figure 9: Class 5 (n = 4) ①

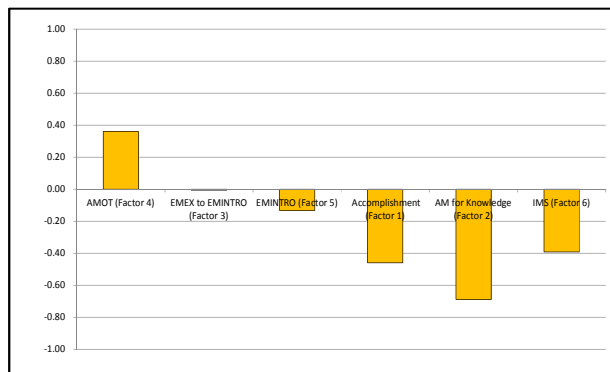


Figure 10: Class 6 (n = 9) ②

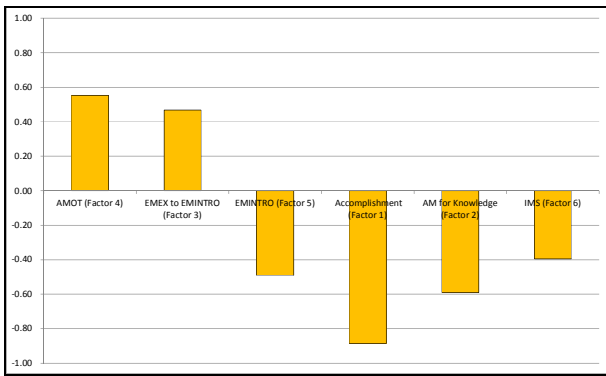


Figure 11: Class 7 ( $n = 13$ )

②

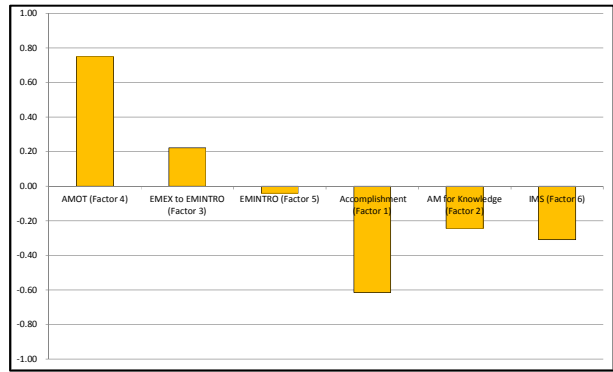


Figure 12: Class 8 ( $n = 19$ )

②

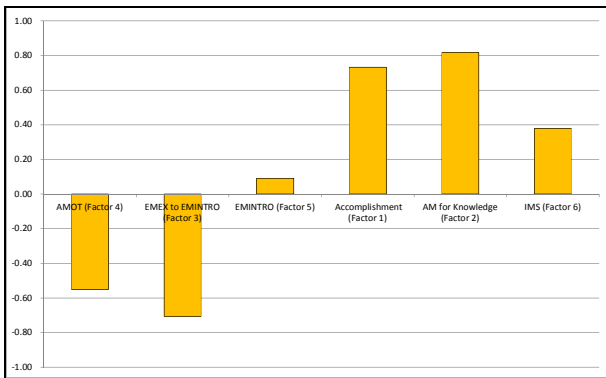


Figure 13: Class 9 ( $n = 15$ )

①

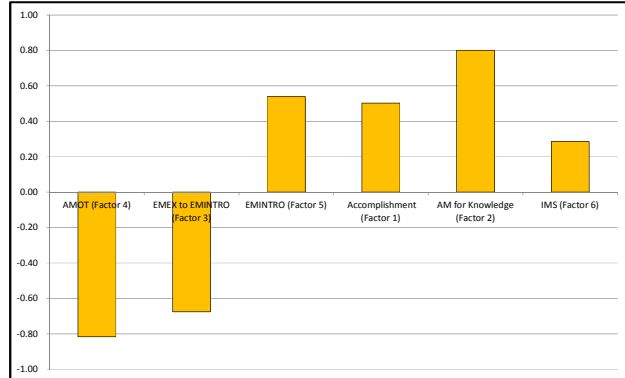


Figure 14: Class 10 ( $n = 11$ )

①

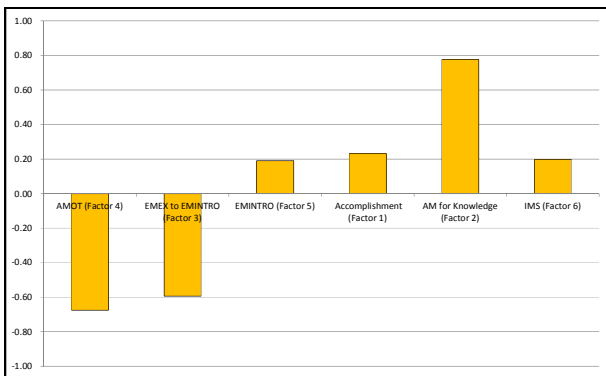


Figure 15: Class 11 ( $n = 9$ )

①

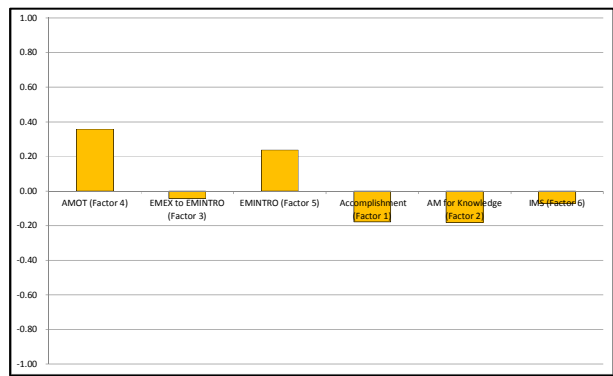


Figure 16: Class 12 ( $n = 20$ )

②

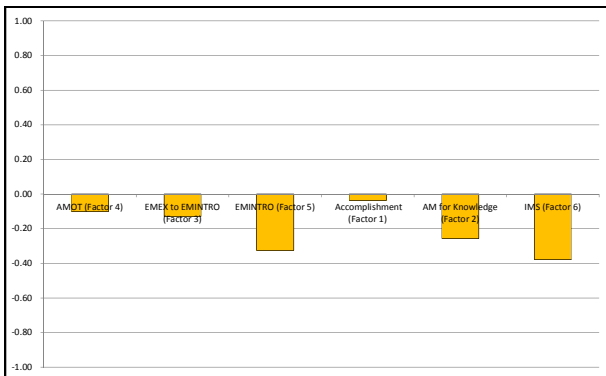


Figure 17: Class 13 ( $n = 32$ )

③

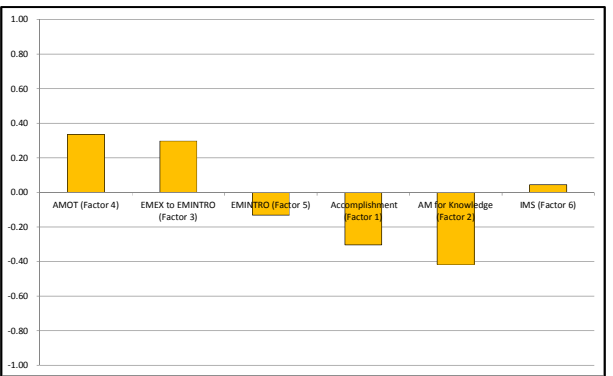


Figure 18: Class 14 ( $n = 27$ )

②

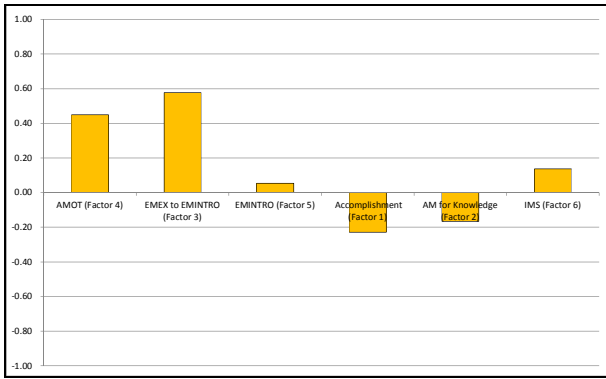


Figure 19: Class 15 ( $n = 23$ )

②

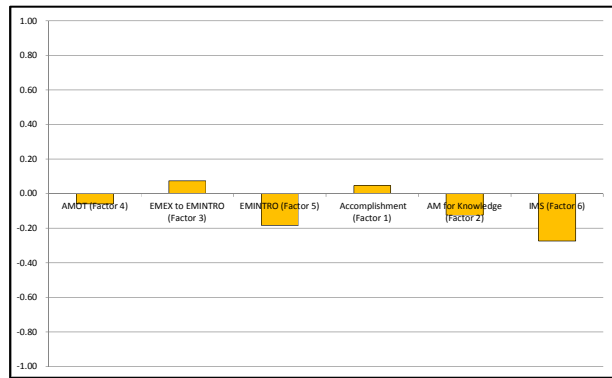


Figure 20: Class 16 ( $n = 27$ )

③

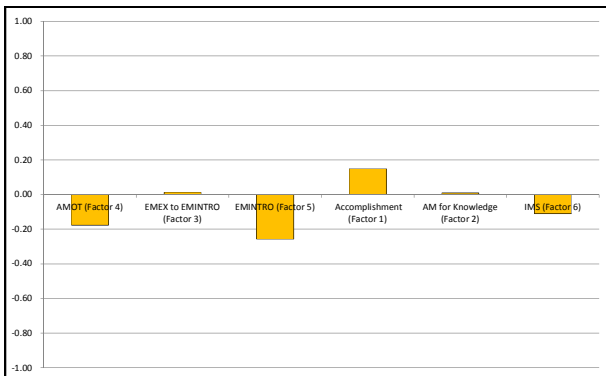


Figure 21: Class 17 ( $n = 27$ )

③

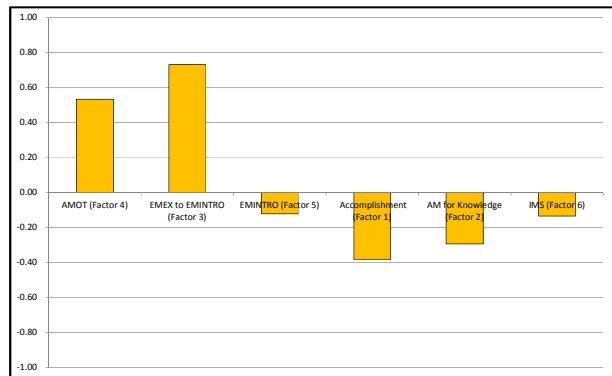


Figure 22: Class 18 ( $n = 25$ )

②

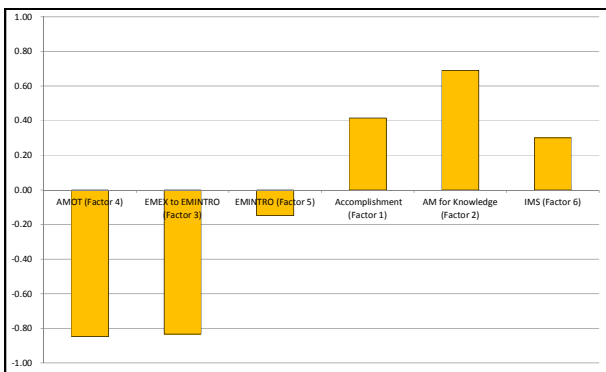


Figure 23: Class 19 ( $n = 19$ )

①

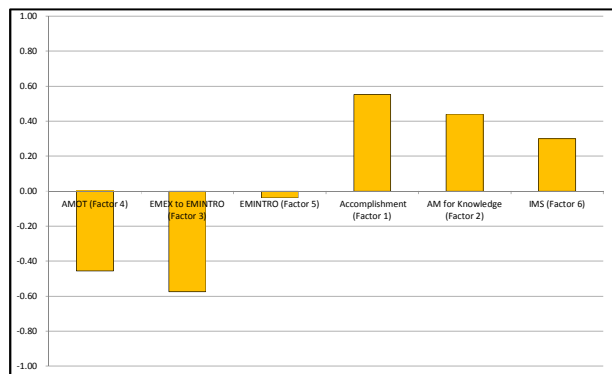


Figure 24: Class 20 ( $n = 8$ )

①

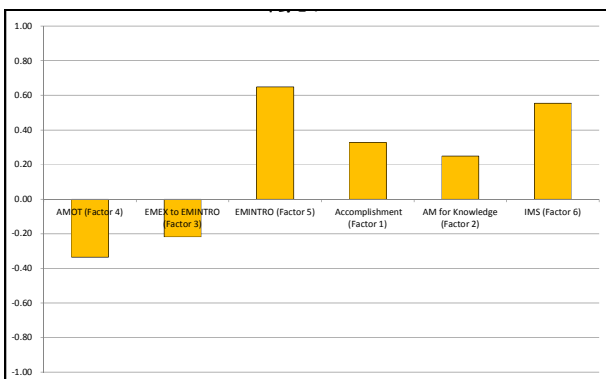


Figure 25: Class 21 ( $n = 14$ )

①