

# **A Longitudinal Study on Japanese University Students' Motivational Styles Toward Learning English in CMC Activities**

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## **Abstract**

This paper shows a part of our longitudinal study on Japanese university students' motivational styles toward learning English in computer-mediated communication (CMC) activities. The purpose of this study is two-fold: (1) to elucidate the students' motivational styles toward the activities by clustering each of the individual motivational predispositions and (2) to discuss ideal learning environments for the students based on Self-Determination Theory (e.g., Deci & Ryan, 1985). To do so, we administered a questionnaire with 24 items, each of which was designed to assess the types of intrinsic motivation, extrinsic motivation and amotivation among the students participated in the activities. The data were subject to exploratory factor analysis to examine the internal structures of motivation constructs and the resulting individual factor scores were subject to cluster analysis to classify the types of motivational styles among the students. The results indicated that there must be four types of motivational styles whereby we can divide the students into (1) autonomous learners, (2) learners motivated by introjection (3) relatively demotivated learners and (4) amotivated learners. On the basis of these findings, we discussed the potential problems behind the CMC activities and proposed some motivating strategies for the students with reference to SDT.

## **Keywords**

Motivational Styles, Intrinsic Motivation, Extrinsic Motivation, Amotivation, Computer-Mediated Communication

## **1 Introduction**

With the recent development of information and communication technology (ICT), now we can have easy and affordable access to the Internet. The ubiquitous nature of the Internet access has provided substantive benefits for us and changed our lives in many ways. For example, the technological development enables us to enjoy a number of opportunities to communicate with people around the world. In fact, the advent of easy-to-use mobile devices such as smartphones and tablet computers has accelerated the use of video-phone call, instant messenger and short message service whereby we can communicate with others in the context of computer-mediated communication (CMC). The increasing use of these CMC services, each of which is often incorporated into social networking service (SNS), is vividly illustrated by the fact that the number of SNS users has rapidly increased year by year (Ministry of Internal Affairs and Communications, 2012). The growing popularity of CMC services subsumed into SNS demonstrates the potentiality of such ICT-enabled communication for promoting one's reciprocal interactions with others, as an alternative to ordinary face-to-face communication. In this vein, CMC has attracted significant attention and thus, been currently studied as an interdisciplinary research topic.

Within the realm of English language education, in particular, the popularity of ICT-enabled communication has drawn renewed attention in late years, and the effectiveness of CMC on learners' language achievements has been frequently researched and discussed under the rubric of computer-assisted language learning (CALL). Indeed, with the aid of CMC, people who learn English as a foreign language (henceforth, EFL learners) come to be able to not only practice speaking English as a foreign language with native speakers of English but also to practice using English as a Lingua Franca (ELF) with various English users with different first languages. Therefore, this sort of CALL learning environment is considered to have a great potential to benefit the EFL learners. As a result, a number of higher education facilities have

incorporated some of CALL activities into their curricula of foreign language education (for details, see Stockwell, 2012). As such, CALL comes to be recognized as a currently challenging and appropriate method for increasing learners' exposure to quasi-authentic English communication and thereby enhancing their English proficiency. However, there still remain some problems to be solved. One of the crucial problems to be solved is lack of learners' motivation toward CALL activities (Stockwell, 2012). As Nakano (2006) pointed out, unless learners have enough motivation toward CALL, they will never improve their English proficiency in the given learning context.

Informed by the above discussion and with reference to the relevant motivation theory called Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000b, 2002), we have been conducting a longitudinal study among the tertiary-level Japanese EFL learners with the aim to depict their motivational styles toward CALL activities and to discuss the potential motivating strategies to enhance their motivation. The target CALL activities that we have dealt with in our previous surveys are called CCDL CMC activities, which include video-conferences and CMC chat sessions subsumed in a distance learning program called Cross-Cultural Distance Learning (CCDL). In our previous surveys (Nakano & Yoshida, 2008; Nakano, Yoshida, & Owada, 2008; Yoshida, 2010; Yoshida & Nakano, 2009, 2010), we found that, as Nakano (2006) pointed out, the students who opted to participate in the activities were found to be autonomously motivated whereas those who were externally regulated to engage in the activities were highly likely to be demotivated and some were found to be unmotivated to do so. This finding implied the applicability of SDT framework for investigating the potential motivational problems behind the target CMC activities. Yoshida and Nakano (2013) further discussed the effect of class types (i.e., elective or compulsory) on the students' motivational predispositions toward the target CMC activities among 21 different English classes ( $n_{\text{elective}} = 5$ ;  $n_{\text{compulsory}} = 16$ ). As a result, we found that autonomy-supportive nature of elective classes can be one of the key elements to predict the students' motivational dispositions; indeed, all the elective classes were categorized into a desirable class type where most of the students were, on average, predisposed toward autonomous learners. However, we also found that controlling nature of compulsory classes could not necessarily be a key element to predict the motivational predispositions among the students; in fact, only 8 out of the 16 classes (i.e., 50 %) were categorized into an undesirable class type where most of the students were, on average, predisposed toward externally regulated learners, and moreover, 4 out of the 16 classes were categorized into the desirable class type mentioned above. These inconclusive findings can be attributable to our rough categorization criteria used in our previous surveys and thus, called for a need to further illustrate the students' motivational styles toward the target activities.

In the light of the findings in our previous surveys, therefore, we are currently conducting a series of surveys among the participating students in the target CMC activities. The primary aim of the current surveys is two-fold: (1) to elucidate the students' motivational styles toward the activities by clustering each of the individual motivational predispositions and (2) to discuss ideal learning environments for the students based on SDT. The research hypotheses we made in the light of the above research purposes were (1) there must be, at least, more than 3 prominent motivational styles among the students<sup>1</sup>, and (2) if the resulting motivational styles can be interpretable from the perspective of SDT, the research findings in the previous SDT works can shed some light on our discussions on the ideal learning environments as well as effective motivating strategies for the students. The following sections provide a brief summary of SDT.

### 1.1 Self-Determination Theory

To discuss the students' motivational styles toward CCDL CMC activities, we have employed the theoretical framework of SDT. SDT is a comprehensive theory on human motivation and thus, has been frequently applied to the field of education (Deci, Vallerand, Pelletier, & Ryan, 1991; Reeve, 2002; Vallerand & Bissonnette, 1992) and second language acquisition (Hayashi, 2012; Noels, 2001a, 2001b, Noels, Pelletier, Clément & Vallerand., 2000; Park, 2006; see also Dörnyei, 1994). The motivation concepts elaborated in

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<sup>1</sup> Yoshida and Nakano (2013) roughly divided the students' motivational predispositions toward the target CMC activities into the following three types: (1) predisposition toward autonomous learners (Mean factor scores on autonomous types of motivation were higher than each of the grand means whereas the scores on controlled types of motivation were lower than each of the grand means.), (2) predisposition toward externally regulated learners (Mean factor scores on controlled types of motivation were higher than each of the grand means whereas the scores on autonomous types of motivation were lower than each of the grand means.), and (3) Others (Mean factor scores on the 6 factors were found to be almost equal to each of the grand mean.).

SDT are called intrinsic motivation, extrinsic motivation and amotivation. As in Figure 1, these three types of motivation have been hypothesized to consist of the self-determination continuum.

On the continuum, three types of motivation are ordered along with the degree of self-determination (i.e., autonomy) accompanying the resulting behaviors; that is, from left to right, the resulting behaviors can be described as *non-self-determined* to *fully self-determined*. Thus, this relationship has been called self-determination (or autonomy) continuum. On the basis of the degree of self-determination, each of the three types of motivation has been defined as follows.

Behavior	Nonself-determined				Self-determined	
Type of Motivation	Amotivation	Extrinsic Motivation				Intrinsic Motivation
		Controlled		Autonomous		
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, slightly modified by the authors on the basis of Deci and Ryan (2000, p.237)

### 1.1.1 Amotivation

Amotivation, which is placed on the left extreme, has been defined as the lack of motivation as well as self-determination (Deci & Ryan, 2000), so that the resulting behaviors are supposed to be non-self-determined. SDT has further enumerated a prominent feature of amotivation as absence of intentionality to do the target activity. This feature is indicated by the dot-line between amotivation and extrinsic motivation in Figure 1.

### 1.1.2 Extrinsic motivation

The concept of extrinsic motivation elaborated in SDT is different from those discussed in the traditional motivation theories in that SDT has defined the concept as, more or less, having some degree of self-determination, and that SDT assumed four subtypes of extrinsic motivation called external regulation, introjected regulation, identified regulation, and integrated regulation (Deci & Ryan, 2000).

*External regulation* is a type of extrinsic motivation with the least level of autonomy (Deci & Ryan, 1985). Thus, if our students are externally regulated to engage in the target CALL activities, they feel as if they are forced to do so by the external pressures posed by teachers or learning environment. It is also important to note that if the students are exposed to such pressures, they are highly likely to be demotivated and finally amotivated toward the target activities (Nakano & Yoshida, 2008).

*Introjected regulation* is a slightly self-determined type of extrinsic motivation (Deci, Vallerand, Pelletier, & Ryan, 1991). Although this type of extrinsic motivation is said to be more desirable than external regulation, the students whose behaviors are regulated by introjection are likely to feel as if they are forced to engage in the target activities by internal pressures posed by his/her own self (Deci & Ryan, 2000).

If the students come to digest the introjection, they are expected to identify the value or importance of the activities in question. At this stage, the students are likely to regulate themselves to engage in the target activities because they recognize themselves why they should do so; this is a main feature of *identified regulation*. Thus, identified regulation has been regarded as an autonomous type of extrinsic motivation.

Lastly, integrated regulation has been defined as a fully autonomous type of extrinsic motivation (Deci & Ryan, 2000). As the self-determination continuum indicates, this type of motivation has been regarded as almost the same as intrinsic motivation. According to Deci et al. (1991), however, there are some slight differences between these two types of motivation in that integrated regulation involves some instrumentality with respect to doing the target activities.

### 1.1.3 Intrinsic motivation

Intrinsic motivation has been defined as “a prototypical form of self-determination” (Deci & Ryan, 1991, p.253) and the resulting behaviors have often been described as fully self-determined (i.e., autonomous). Thus, if the students in CCDL program are intrinsically motivated toward the target CMC activities, she/he is

expected to engage in the activities “with a full sense of choice, with the experience of doing what one wants” (p.253). It is also important to note that some previous SDT works (Vallerand, Pelletier, Blais, Briere, Senecal, & Vallieres, 1992, 1993) established a taxonomy for intrinsic motivation and conceptualized three types of intrinsic motivation: *intrinsic motivation for knowledge*, *intrinsic motivation for accomplishment* and *intrinsic motivation for stimulation*. These types are said to be categorized by the kinds of triggers that are expected to provoke the sense of intrinsic motivation.

## **2 Method**

### **2.1 Participants**

The participants in this study were 706 Japanese university students<sup>2</sup>. These students were all enrolled in the target CMC activities in the spring semester ( $n = 367$ ) or/and in the fall semester ( $n = 336$ ) of 2012, as a part of classroom activities or extra-curricular activities.

### **2.2 Questionnaire**

Questionnaire used in this study was based on the Language Learning Orientation Scale (LLOS: Noels, Pelletier, Clément & Vallerand, 2000; see also Park, 2006; Yoshida, 2010) and Academic Motivation Scale (Vallerand et al., 1992, 1993). This instrument contained 24 items, each of which was designed to be a possible reason for engaging in the CCDL CMC activities and can be divided into the following 7 subtypes of motivation. (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 questionnaire items, the students were asked to indicate to what extent each of the reasons corresponded to his or her reasons for participating in the CMC activities, along with 5-point Likert Scale.

### **2.3 Analytic Procedure**

First, we summarized the descriptive statistics for the 24 items in our questionnaire and checked ceiling effect and floor effect.

Second, in order to examine the internal structure of motivation construct, the data gathered in both the spring and fall semesters of 2012 were combined and analyzed in terms of exploratory factor analysis (EFA). In EFA<sup>3</sup>, we employed maximum likelihood method for factor extraction, Promax rotation for factor rotation and retained those items with factor loading of above  $|0.35|$ , as in our previous surveys (e.g., Yoshida & Nakano, 2013). In deciding the appropriate number of factors to be extracted, we referred to the result of the test of goodness of fit as well as scree plot provided in the analyses.

Lastly, the resulting individual factor scores were subject to cluster analysis (CA) to classify the types of motivational styles among the students. In CA, we employed both hierarchal and non-hierarchical cluster analysis as in Hayashi (2012). As the first step, we conducted hierarchical cluster analysis to decide the number of clusters with reference to the resulting dendrogram, and then, as the second step, run nonhierarchical cluster analysis.

## **3 Results and Discussion**

### **3.1 Descriptive statistics**

<sup>2</sup> Those who did not answer more than 2 items on the questionnaire were excluded from the analysis.

<sup>3</sup> All the analytic procedures used in EFA were the same as those in our previous surveys (for details, see Yoshida, 2010; Yoshida & Nakano, 2009).

Table 1 shows the summary of descriptive statistics for the 24 items in our questionnaire.

As the resulting values of mean minus 1 standard deviation (i.e.,  $M-1SD$ ) indicate, the students' responses on items 13 (AMOT 1) and 21 (AMOT 2) might be affected by floor effect. As we encountered the same problem in our previous surveys (e.g., Yoshida & Nakano, 2013), we found that these items never happened miscomputations in the process of EFA. Therefore, we decided to retain them in the following analyses.

Table 1: Summary of Descriptive Statistics

<i>Item</i>	<i>Subscale &amp; Item No.</i>	<i>M</i>	<i>SD</i>	<i>M+1SD</i>	<i>M-1SD</i>	<i>N</i>
Item1	IMA3	3.12	1.06	4.18	2.06	699
Item2	EMID4	3.31	1.18	4.49	2.13	702
Item3	IMS3	3.48	1.13	4.61	2.35	700
Item4	EMEX4	2.24	1.16	3.40	1.09	698
Item5	IMK1	3.83	1.05	4.88	2.79	695
Item6	EMID3	3.58	1.12	4.69	2.46	701
Item7	EMINTRO4	2.24	1.13	3.37	1.11	702
Item8	EMEX3	3.13	1.17	4.29	1.96	701
Item9	IMK2	3.71	1.05	4.76	2.66	701
Item10	EMEX2	3.11	1.17	4.29	1.94	695
Item11	IMA2	3.04	1.16	4.20	1.88	700
Item12	AMOT3	2.20	1.12	3.32	1.07	697
Item13	AMOT1	2.00	1.12	3.12	0.88	700
Item14	EMINTRO3	2.46	1.13	3.59	1.33	699
Item15	IMA1	3.37	1.05	4.42	2.32	698
Item16	IMS1	3.03	1.14	4.17	1.90	674
Item17	EMID2	3.54	1.07	4.61	2.46	696
Item18	IMS2	3.42	1.08	4.50	2.34	701
Item19	EMID1	3.65	1.07	4.72	2.57	698
Item20	EMINTRO2	2.88	1.12	3.99	1.76	701
Item21	AMOT2	1.73	1.00	2.72	0.73	699
Item22	IMK3	3.81	1.07	4.87	2.74	700
Item23	EMEX1	2.26	1.26	3.52	1.00	698
Item24	EMINTRO1	2.57	1.16	3.73	1.42	700

### 3.2 Results of EFA

On the basis of the above discussion, we put all the 24 items in EFA. As a result, we extracted 6 correlated factors,  $\chi^2 = 214.56$ ,  $df = 114$ ,  $p < .001^4$ . Table 2 shows the pattern matrix obtained in the final EFA. Table 3 summarizes the resulting correlation matrix among the 6 factors. In this matrix, each of the 6 factors was arranged along with the self-determination continuum.

In the light of the results in Tables 2 and 3, we renamed each of the 6 factors as follows.

Factor 1: Autonomous Motivation for Knowledge (AMK)

Factor 2: Autonomous Motivation for Accomplishment (AMA)

Factor 3: Amotivation (AMOT)

Factor 4: Transitional Phase between EMEX and EMINTRO (EMEX to INTRO)

Factor 5: Introjected Regulation (EMINTRO)

Factor 6: Intrinsic Motivation for Stimulation (IMS).

As in Table 3, inter-correlations among the 6 extracted factors were found to show a sort of quasi-simplex pattern, suggesting that there must be almost the same relationships as those hypothesized in the self-determination continuum. This result also suggested a piece of evidence with respect to the construct validity of our questionnaire items (see Vallerand & Bissonnette, 1992).

<sup>4</sup> This result indicated that there might be more latent factors to be extracted. However, we stopped the analysis at this stage on the basis of the interpretability of the resulting factor structure as well as the fact that further extraction might well cause Heywood case.

Table 2: Pattern Matrix

<i>Subscale</i>	1	2	3	4	5	6
IMK1	<b>.946</b>	.076	.061	.063	-.074	-.164
IMK3	<b>.872</b>	-.172	.010	.072	-.115	.040
IMK2	<b>.869</b>	-.062	-.006	.066	-.094	.091
EMID3	<b>.528</b>	.221	-.019	-.067	.140	-.011
EMID2	<b>.490</b>	.016	-.059	-.074	.144	.248
IMS3	<b>.489</b>	.264	.040	-.111	.101	-.057
EMID4	-.050	<b>.787</b>	-.048	-.082	.066	-.177
IMA3	.030	<b>.746</b>	.024	.014	-.236	.115
IMA2	-.056	<b>.728</b>	.057	.129	-.134	.297
EMEX2	.083	<b>.433</b>	-.110	.060	.328	-.033
AMOT1	.044	.011	<b>1.037</b>	-.204	.058	-.007
AMOT3	.024	-.105	<b>.707</b>	.031	.110	-.022
AMOT2	-.041	.122	<b>.644</b>	.164	-.044	.065
EMEX4	.019	-.001	.008	<b>.839</b>	.001	.026
EMINTRO4	.111	.005	-.048	<b>.790</b>	.155	-.035
EMEX1	-.039	.000	.171	<b>.570</b>	-.047	-.067
EMEX3	-.035	.082	-.135	<b>.385</b>	.186	-.005
EMINTRO2	-.009	-.110	-.048	.100	<b>.755</b>	.045
EMINTRO3	-.073	-.150	.191	.115	<b>.680</b>	-.010
EMINTRO1	-.117	.307	.123	.120	<b>.386</b>	.050
IMS1	.023	.190	.035	.007	-.024	<b>.653</b>
IMS2	.138	.024	-.040	-.101	.193	<b>.597</b>
% of var.	32.441	11.814	4.426	3.009	2.351	2.281
eigenvalue	7.531	3.129	1.398	1.083	1.035	.813

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

Table 3: Correlation Matrix

	AMOT	EMEX to EMINTRO	EMINTRO	AMA	AMK	IMS
AMOT	(0.89)	.668	-.061	-.434	-.483	-.304
EMEX to EMINTRO		(0.73)	-.139	-.398	-.556	-.326
EMINTRO			(0.82)	.563	.549	.533
AMA				(0.70)	.645	.581
AMK					(0.63)	.618
IMS						(0.80)

Note: The values in diagonal elements are Cronbach's alpha reliability coefficient for each of the 6 factors.

### 3.3 Results of CA

The results of CA indicated that there must be four types of motivational styles and thereby we can divide the students into the following groups:

- Group (1) Autonomous Learners ( $n = 262$ )
- Group (2) Learners Motivated by Introjection ( $n = 88$ )
- Group (3) Relatively Demotivated Learners ( $n = 249$ )
- Group (4) Amotivated Learners ( $n = 104$ ).

Figure 2 shows the graph representing mean factor scores calculated for the above 4 groups (see also Appendix for details).

As in Figure 2, the students in Group (1) scored highly on autonomous types of motivation (i.e., EMINTRO, AMA, AMK and IMS) but scored lower than the grand means (i.e., zero) on the controlled types of motivation (i.e., AMOT and EMEX to EMINTRO). Thus, we regarded these students as *Autonomous Learners*. The students in Group (2) scored highly on the autonomous types of motivation (i.e., EMINTRO,

AMA, AMK and IMS) but their scores on the controlled types of motivation (i.e., AMOT and EMEX to EMINTRO) were also higher than the grand means. This result implied that the students in this group might be suffered from dilemma as a result of introjection. Therefore we named these students *Leaners Motivated by Introjection*. The students in Group (3) scored slightly lower than the grand means on autonomous types of motivation (i.e., EMINTRO, AMA, AMK and IMS) and their scores on controlled types of motivation (i.e., AMOT and EMEX to EMINTRO) were found to be slightly higher than the grand means. The students in Group (4) also showed the same but more obvious patterns as those in Group (3). As a result, we renamed the students in Group (3) *Relatively Demotivated Learners* and those in Group (4) *Amotivated Learners*.

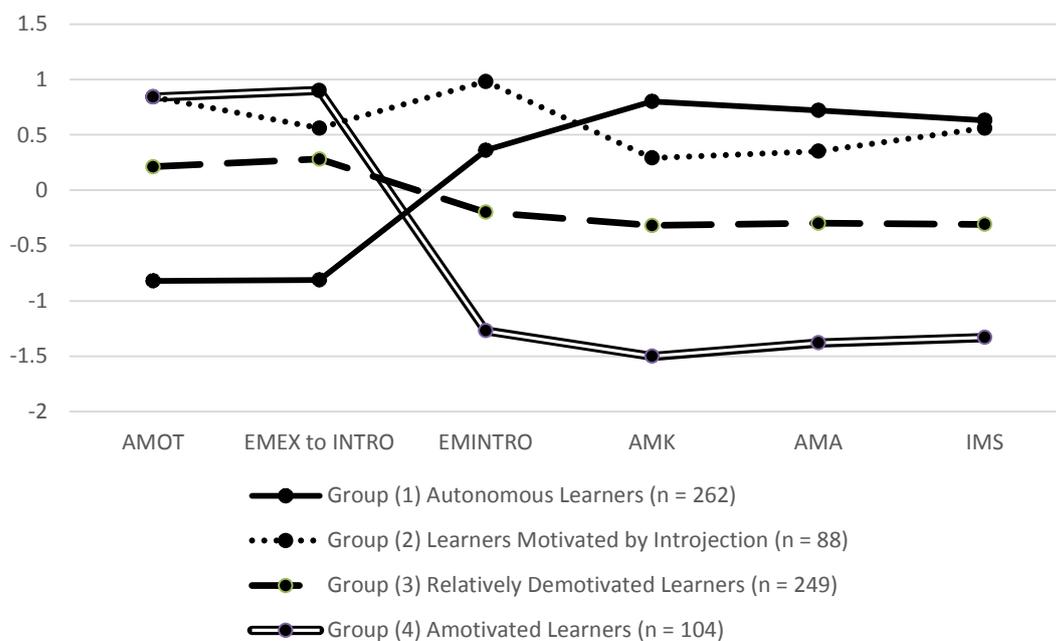


Figure 2: Motivational styles among students

### 3.4 Discussion

#### 3.4.1 Four types of motivational styles and SDT

In 4.3, we found that there must be 4 types of motivational styles, which can be the benchmark for dividing the students into 4 groups: Group (1) Autonomous Learners, Group (2) Learners Motivated by Introjection, Group (3) Relatively Demotivated Learners and Group (4) Amotivated Learners. As we hypothesized, there were possibly four prominent types of motivational styles among the students. Furthermore, each of these 4 groups was highly interpretable and their features can be logically explained by SDT framework. This result provides a piece of evidence with respect to the applicability of SDT framework for elucidating the students' motivational styles toward the target CMC activities. At the same time, the result must suggest another possibility of SDT framework for discussing the ideal learning environments as well as effective motivating strategies for enhancing the students' motivation, as our research hypothesis (2) indicates. Drawing on the findings in the previous SDT works (Deci & Ryan, 1985; Deci et al., 1991; Reeve, 2002), therefore, we provide a brief summary on these motivational issues in the following section.

#### 3.4.2 Ideal learning environments and effective motivating strategies for the students

To maintain the desirable motivational styles among the students in Group (1), the instructors in charge of the target activities should provide challenging materials and assignments, which are optimal for the students' English proficiency (Deci & Ryan, 1985), give supportive feedback on their performance (Reeve, 2002) and incorporate what the students want to discuss into the topics to be discussed in the activities (Nakano & Yoshida, 2008; Yoshida, 2010).

To promote the internalization with respect to the task participation among the students in Group (2), the instructor should employ autonomy-supportive teaching style as discussed above and encourage the students

to internalize the reason why it is important to join the activities and to recognize what they can achieve in the activities (Nakano, 2006).

To enhance motivation among the students in Groups (3) and (4), the instructors and designers of the activities should strive to find out the potential demotivating factors. In so doing, it is important to examine whether the current learning environment can satisfy the students' psychological needs for *autonomy*, *competence* and *relatedness*, each of which has been regarded as important motivating factors in SDT. According to the previous SDT works (e.g., Reeve, 2002), furthermore, it is better to check the following points at the very beginning of course evaluation.

1. Instructors' teaching styles: To satisfy the students' psychological needs for autonomy, check the instructors' teaching styles. If their teaching styles are found to involve some controlling aspect, replace them with more autonomy-supportive teaching styles as much as possible.
2. Level of the tasks, materials and assignments: To satisfy the students' psychological needs for competence, check the levels of tasks, materials and assignments provided in the target activities in the light of the students' English proficiency. If the levels are found to be inappropriate (i.e., too easy or too difficult), it is important to adjust them to be optimal for the students.
3. Grouping of the students: To satisfy the students' psychological needs for competence and relatedness, check whether there are significant differences in English proficiency among the students in the same group. If some significant differences are found in some groups, it is better to regroup the students.

To further the discussion on the ideal learning environments, it is necessary to assess to what extent our students could satisfy the three psychological needs in the target CMC activities in our future study.

#### 4 Conclusion

The primary aim of the surveys cited in this paper was two-fold: (1) to elucidate the students' motivational styles toward the activities by clustering each of the individual motivational predispositions and (2) to discuss the ideal learning environments for the students based on SDT. As in our research hypothesis (1), we could find the following 4 different types of motivational styles among the students: Group (1) Autonomous Learners ( $n = 262$ ), Group (2) Learners Motivated by Introjection ( $n = 88$ ), Group (3) Relatively Demotivated Learners ( $n = 249$ ), Group (4) Amotivated Learners ( $n = 104$ ). The interpretability of these 4 motivational styles indicated the applicability of SDT framework for duplicating the students' motivational styles on one hand and, as mentioned in our research hypothesis (2), further suggested another possibility of SDT framework for investigating the ideal learning environments as well as effective motivating strategies for the students on the other hand. On the basis of the discussion in 3.4, our future study will focus on the effect of the students' psychological needs for autonomy, competence and relatedness on their motivational styles toward the target CMC activities.

It is also important to note here that, in EFA conducted with the same procedures as in our previous surveys, we extracted 6 correlated factors. The inter-correlations among these 6 factors showed a sort of quasi-simplex pattern and furthermore, almost the same pattern as those found in the previous surveys. These findings provided the reliability as well as the construct validity of our questionnaire items.

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**Appendix 1: Means and Standard Deviations for 4 groups**

Motivational Styles	AMOT	EMEX to INTRO	EMINTRO	AMK	AMA	IMS
Autonomous Learners (n = 262)	-0.82 (0.38)	-0.81 (0.48)	0.36 (0.67)	0.80 (0.48)	0.72 (0.61)	0.63 (0.58)
Learners Motivated by Introjection (n = 88)	0.84 (0.79)	0.56 (0.74)	0.98 (0.55)	0.29 (0.51)	0.35 (0.61)	0.56 (0.49)
Relatively Demotivated Learners (n = 249)	0.21 (0.68)	0.28 (0.70)	-0.20 (0.53)	-0.32 (0.50)	-0.30 (0.51)	-0.31 (0.57)
Amotivated Learners (n = 104)	0.84 (0.97)	0.90 (0.81)	-1.27 (0.70)	-1.50 (0.75)	-1.38 (0.62)	-1.33 (0.63)