

Effects of Japanese University Students' Characteristics on the Use of an Online English Course and TOEIC Scores

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Abstract

The effective use of Information and Communication Technology (ICT) can have positive effects on the development of learners' English abilities. To what degree it is effective is partly determined by learners' characteristics in ICT use. However, these characteristics have not yet been sufficiently discussed in Japan. This study, then, explored how the characteristics of Japanese EFL university students related to their actual use of an online English course and whether it led to the development of their English abilities. In the survey, 130 Japanese university students were asked to self-evaluate their attitudes toward computer-assisted language learning (CALL) and the use of technology in an out-of-classroom situation. As a result, it became clear that most of the students were not confident in using the technology and did not use it actively outside the classroom. Cluster analysis was employed with a focus on individual differences, revealing that the time students actually spent on the course and their high evaluations of the effectiveness of CALL did not necessarily predict development of English abilities. It was suggested that individual differences should be carefully considered in adopting online English courses effectively in higher education institutions.

KEYWORDS: ICT, CALL, SELF-REGULATED LEARNING, OUT-OF-CLASS ONLINE LANGUAGE LEARNING, EFL, INDIVIDUAL DIFFERENCES

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Introduction

With advancements in ICT, online learning has been introduced to many higher education institutions. Seaman, Allen, and Seaman (2018), for instance, collected data from all the higher education institutions in the United States and pointed out that 31.6% of the students took some or all of their courses online in 2016. By synthesizing the research literature on online learning, the U.S. Department of Education (2010) found that learning outcomes in online learning were “modestly” (p. 51) better than those during face-to-face conditions. However, no other systematic reviews have been conducted recently and the evidence of the effectiveness of online learning should be updated. In contrast, in Japan, where English is taught as EFL, only 15.6% of institutions adopted online courses in 2015 (AXIES, 2016; AXIES is the university consortium promoting the use of ICT in Japan). Surprisingly, 53.4% of the institutions responded that they did not measure the effectiveness of ICT. Therefore, it is crucial to investigate how effective the use of ICT may be in language classrooms in higher education. In this investigation, learners’ characteristics, which have not yet been fully discussed, must be considered because they have been hypothesized to influence learners’ actual use of ICT (Davis, Bagozzi, & Warshaw, 1989). This article attempted to explore to what extent first-year Japanese English-major university students developed their English abilities when studying in an online English course. Specifically, it investigated how learners’ characteristics led to their actual use of an online English course and the development of their English abilities. The participants in this study did not have any experiences of learning English online and it is hoped that the result of this study has some implications for the other language learners who are new to this technology.

Factors Predicting Learners’ Actual Use of ICT in the Language Classroom

When ICT has become accessible in the language classroom, teachers have been more interested in measuring its effectiveness on learning outcomes. Several studies synthesized the previous literature in this field and concluded that the use of ICT has had positive effects (Grgurović, Chapelle, & Shelley, 2013; Lin, 2015; Liu, Moore, Graham, & Lee, 2002). Grgurović et al. (2013), for instance, conducted a meta-analysis to synthesize the research on technology-supported language teaching in ESL/EFL from 1970 to 2006. In comparison with non-CALL groups, they concluded that the use of ICT in ESL/EFL was “at least as effective as instruction without technology” (p. 191). As for type of technology such as CALL, computer application, Computer Mediated Communication

(CMC), Web, Course Management System, and online courses, online courses had a much greater effect than the other types.

In order to encourage learners to use technology that may lead to the development of English abilities, learners' characteristics should be considered. According to Richards and Schmidt (2010), learner characteristics, which influence learning, include various factors such as age, past learning experiences, learning style, and motivation. Davis et al. (1989), for instance, maintained that intentions to use technology were determined by learners' characteristics, such as how they perceived the usefulness of computers (Sánchez & Hueros, 2010). Furthermore, it has been assumed that these learners' characteristics predict the adoption of self-regulated learning (SRL) and learning outcomes (Wang, Shannon, & Ross, 2013).

Since it was assumed that these characteristics contribute to actual use of technology and learning outcomes, many previous studies adopted the Structural Equation Modeling (SEM) approach to explore the relationship between these factors (Chang, Hajiyev, & Su, 2017; Lee & Choi, 2017; Lee, Yeung, & Ip, 2017). Lai (2013), for instance, conducted a survey of 373 language learners at a university in Hong Kong. The questionnaire items were adapted from existent literature in the field of technology adoption and included several categories: technology use, perceived usefulness of the technology, educational compatibility, computer self-efficacy, facilitating conditions, subjective norms, language learning motivations, language learning approaches, situated interpretation of the context, and self-regulation skills. The analysis of the SEM framework revealed that attitudinal factors such as language learning motivation and perceived usefulness of the technology for learning played an important role in the technology's use.

In Hsu's (2016) study, 341 EFL learners in Taiwan, who had joined a self-regulated English pronunciation-training program over a period of three months, were asked to complete a questionnaire after completing the course. The survey items included questions about their demographic information, perceptual learning styles, and relative acceptance of technology. Based on the SEM analysis, it became clear that learners' learning styles influenced their perceived ease of using the system, and that perceived usefulness related significantly to the learner's attitude toward using the system.

Celik and Yesilyurt (2013) conducted a survey to investigate the correlation between the effect of computer supported education, perceived computer self-efficacy, computer anxiety, and attitude toward technology. The participants were 471 first year university students who studied at the Faculty of Education in a Turkish university. The tools used for data analysis included factor analysis and SEM and it became clear that the student's attitude toward technology positively affected perceived computer self-efficacy, computer anxiety, and

computer supported education. Specifically, perceived computer self-efficacy, computer anxiety, and attitude toward technology were the most important predictors of the outcomes in computer supported education.

Most of the studies reviewed above adopted a survey as their research methodology. Their main purpose was to explore the complex interrelationships between the factors that led to the actual use of the technology. In summary, it is assumed that learners' characteristics may predict the successful employment of self-regulated learning skills and will in turn lead to the actual use of the technology (Tabak & Nguyen, 2013; Tsai, 2015). The questionnaires used in these surveys more precisely investigated learners' beliefs or intentions to use the technology and not their actual behaviors. Very little research has examined the relationship between learners' characteristics and their actual use of the technology. One exception is Kizilcec, Pérez-Sanagustín, and Maldonado (2017), who investigated the relationship between learners' characteristics, self-regulated learning strategies and skills, and actual goal attainment in Massive Open Online Courses (MOOC). They investigated 4,831 MOOC learners who were asked to provide their demographic information, intentions for using online courses, and self-regulated learning strategies. These data were analyzed with the MOOC log. The results indicated that learners with high levels of SRL skills would visit the site frequently and attained their objectives successfully.

As is reviewed above, learners' characteristics are assumed to influence their actual use of ICT. In Japan, adopting online English courses in higher education is still not so common and, to the best of my knowledge, there is no such study investigating the relationships. The purpose of this study, then, was to explore whether learners' characteristics were crucial to successful online English learning. Based on the literature review, this study addressed the following research question: do the learners' characteristics predict their behaviors in an online English course and the development of their English abilities accordingly?

Participants and the Setting of the Study

Participants were 130 first-year English-major students, whose English proficiency ranged from A1 to B1 in CEFR, at a private university in Japan (female = 58%, male = 42%). These students took a newly introduced online English-skills course in 2017. The course was aimed at developing TOEIC-related skills by a commercial English online learning platform and students accessed the contents from smartphones or computers. The students first took an online diagnostic test and then studied personalized learning materials, which were provided by the system automatically based on their levels and progress. The minimum requirement for the credit was to finish 45 skill-based lessons (i.e.,

listening, reading, and grammar) in 15 weeks. All of the learning materials were provided online and the students studied out-of-class, not in the classroom. Therefore, it was assumed that learners' characteristics such as high SRL skills would predict their active use of an online course and English abilities development. In order to promote the students' out-of-class autonomous learning, weekly 30 minutes sessions were set, in which the students could consult with the teacher.

Data Collection Instruments

Two instruments were employed to investigate the learners' characteristics. The first was the computer assisted language learning attitude scale (Kawaguchi & Kusanagi, 2016). This instrument was developed by extracting five categories that had been used in research on affective factors in CALL (e.g., Van Aacken, 1999). The categories were attitudes toward computer operations (CO), social meaningfulness of computer use (SM), the effectiveness of CALL (EC), and the use of multimedia (MM). The novelty of this instrument was that it added a new category, the use of computer-mediated communication (CC), which had not been in the previous instruments. The second instrument employed was invented by Lai, Zhu, and Gong (2015). This scale included five categories regarding the self-regulated use of technology in an out-of-classroom situation; the regulation of attitudinal needs (AN), goal commitment (GC), metacognition (MC), resource needs (RN), and social connection needs (SC). The first scale was meant to explore learners' attitudes or beliefs about CALL and the second one to explore the learners' past learning experiences outside of the class. The validity and reliability of these two instruments were confirmed by checking the correlations and Cronbach's α s (all values were over .70) (e.g. Kawaguchi, 2015; Lai & Gu, 2011).

Procedures

The students took the Test of English for International Communication (TOEIC) at the beginning of the course and the TOEIC Test Tracker, a trial TOEIC exam, at the end of the course. The TOEIC Test Tracker is half the length of an actual TOEIC and was incorporated into the online English course. It correlates highly with TOEIC (Y. Kuribayashi, personal communication, February 15, 2018). At the beginning of the course, the students were asked to respond to the questionnaire on a 5-point Likert scale, ranging from "strongly agree" to "strongly disagree" (Appendix A). The questionnaire consisted of two sections. One was a computer-assisted language learning-attitude scale (Kawaguchi & Kusanagi, 2016) and the other was an out-of-class

self-regulated learning scale (Lai et al., 2015). Two instruments were used in this order because learners' characteristics were assumed to influence out-of-class learning behaviors. The response rate was 92% and 10 minutes were allotted to complete the questionnaire. Data provided by 120 students who responded to all the questionnaire items were used for the analysis. The following analyses were conducted using RStudio 1.1.423 and JASP 0.8.5. First, means, standard deviations, and Cronbach's α were calculated to assess the reliability of the two scales. Second, correlations were calculated to observe the general tendency between each variable. Third, cluster analysis was employed to investigate the individual differences in learners' characteristics. Finally, ANOVA was used to investigate whether there existed significant differences between each cluster.

Results and Discussion

The descriptive statistics for each scale are presented in Appendix A. As for goal commitment (GC), GC3 was excluded from the analysis because Cronbach's α improved from 0.69 to 0.83 when this item was dropped. The values in each category were over .70 and it was assumed that each category was reliable enough to proceed with further analysis. In general, students recognized the importance of computer use (SM), frequently interacted with people via social networking services (CC), and enjoyed using multimedia such as watching movies and listening to CDs (MM). They valued the effectiveness of CALL (EC) as moderate but not as high as the other categories. Although they believed to some extent that the use of ICT could help them achieve their language learning goals (GC), they were not confident in their use of computers (CO) and did not effectively use ICT to manage their learning (AN, MC, RN, SC).

For the purpose of investigating the relationships of learners' characteristics with the use of ICT and English abilities, correlations were calculated. In this analysis, placement TOEIC scores and the TOEIC Tracker, the number of logins to the online learning system, and minutes spent on the online English course were included as variables. Since some questionnaire items were not normally distributed, Spearman's correlation method was employed. Moderate correlations between Placement TOEIC scores and TOEIC Tracker ($r = 0.61$) and categories in Lai et al. (2015) (from $r = 0.22$ to 0.76) were observed. However, learners' characteristics did not correlate with the active ICT use nor TOEIC scores.

As an overall tendency, it was concluded that learners' characteristics did not predict the learners' active use of ICT or the development of English abilities. The data, however, were not normally distributed and were assumed to be influenced by individual learners' differences. SEM has been frequently adopted to

observe the relationships between invisible constructs and measured variables (Kunnan, 1998). In this study, however, cluster analysis was employed because the purpose of this study was to confirm the possible varieties of learners' attitudes. According to Csizér and Dörnyei (2005), cluster analysis is useful in separating learners into subgroups that have similar patterns. Square Euclidean distance and the Ward method were employed because this combination was claimed to be appropriate for studying individual differences (Yamamori, Isoda, Hiromori, & Oxford, 2003). As a result, the dendrogram was obtained, and the students were clustered into three groups. There were 71 students in cluster 1, 32 in cluster 2, and 17 in cluster 3. Means and standard deviations were calculated for each cluster and the Kruskal Wallis test was conducted to investigate the differences between each cluster. Significant differences were found between all of the factors except for social meaningfulness of computer use (SM) and the post-hoc pairwise comparisons were implemented using the Wilcoxon rank sum test with the Bonferroni adjustment method (Appendix B).

Clusters 1 and 3 had some similarities. The students in these clusters rated the effectiveness of CALL (EC) moderately. They could not regulate metacognition effectively (MC). They neither searched actively for online materials to help them learn (RN) nor did they communicate with people online (SC). One of the big differences lay in their attitudes toward social networking services (SNS). Students in cluster 1 frequently used SNS to communicate with other people (CC). Those in cluster 3, on the other hand, did not use SNS as often.

In cluster 2, the students rated many items higher than the students in other clusters did. They evaluated the effectiveness of CALL (EC) highly and frequently used SNS (CC) and multimedia (MM). They were also good at regulating their attitudes (AN), goal commitments (GC), metacognition (MC), resource needs (RN), and social connections (SC). In sum, cluster 1 could be characterized as a group of students that actively used SNS but passively used ICT outside class. Students in cluster 3 were also passive users of ICT and did not use SNS frequently. Students in cluster 2 were active ICT users and believed in the effectiveness of CALL for language learning.

In order to investigate the actual use of the system, each cluster's online login counts ($\chi^2 = 2.67$, $df = 2$, $p = .26$, $\eta^2 = .02$) and minutes spent on the online English course ($\chi^2 = 5.85$, $df = 2$, $p = .05$, $\eta^2 = .05$) were compared using the Kruskal Wallis test, but no significant differences were found. The placement TOEIC ($F = 2.09$, $p = .13$, $\eta^2 = .03$) and TOEIC Tracker scores ($F = 2.97$, $p = .06$, $\eta^2 = .05$) were compared using ANOVA, and again, no significant differences were found. When the outliers, which were above the third quartile or below the first quartile of the data, were removed, however, significant differences emerged ($F = 5.45$, $p = .01$, $\eta^2 = .09$) in the TOEIC Tracker test. The post-hoc analysis with the Bonferroni adjustment indicated that there were significant

differences between clusters 1 and 3 and clusters 2 and 3. The means and standard deviations are displayed in Table 1.

Table 1
Students' Use of the System and English Test Scores

	Cluster 1			Cluster 2			Cluster 3		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Login	71	49.41	16.06	32	53.94	21.04	17	57.41	18.37
Minutes	71	638.00	500.20	32	463.80	151.30	17	533.20	135.60
Placement	68	367.60	69.07	30	383.20	114.00	15	415.00	64.72
Tracker	67	457.70	86.56	31	463.50	87.43	17	516.20	102.00

In the 15-week course, 98% of the students were able to finish 45 lessons. There was a wide variation in the number of logins ($M = 51.75$, $SD = 17.93$) and minutes spent on the online English course ($M = 576.70$, $SD = 401.90$). Presumably, because of these variations, significant differences were not found between the clusters. By exploring individual differences in learners' characteristics using cluster analysis, then, it was assumed that the differences in learners' characteristics might predict the actual use of ICT and the development of their English abilities. Although the correlation matrix only showed low and moderate correlations between each item, the analysis yielded some interesting results.

In cluster 1, they tended to spend much time on the system ($M = 638$ minutes), and three of them actually spent more than 2,000 minutes online. However, TOEIC test placements and TOEIC Tracker scores were the lowest. Learners might have struggled to use the system and accordingly spent longer periods of time on the computer because of their low confidence in their abilities to use the computer ($CO = 2.52$). As in the previous studies, learners' anxieties might influence the learning outcomes (Celik & Yesilyurt, 2013).

Students in cluster 2 rated high on many questionnaire items. According to the previous studies, their readiness to use ICT and their high SRL skills were crucial factors for predicting the use of ICT and the development of English abilities (Tabak & Nguyen, 2013). This was not the case in this study, however. Their placement and TOEIC Tracker test scores were the second highest in the clusters. The number of logins ($M = 53.94$) and minutes spent on the course ($M = 463.80$) were not the highest in the clusters, and the score gain in this cluster ($M = 80.30$) was smaller than the other clusters (cluster 1 = 90.1, cluster 3 = 101.2). As Mahmoodi, Kalantari, and Ghaslani (2014) points out, there is a possibility that SRL skills did not work in the context of this study.

In cluster 3, the placement test scores and TOEIC Tracker scores were the highest. Even though they did not have high confidence in their SRL skills, they were able to develop English abilities effectively. A possible explanation is that the frequent use of SNS interfered with their English learning out-of-classroom in cluster 1 but not in cluster 3. Another possible explanation is that the students in cluster 3 were not good at using ICT outside of the class but knew how to self-regulate their learning offline.

Conclusion

This study used two established scales to link learners' characteristics with their recorded use of ICT and the development of English abilities in an online English course. Since no high correlations were found between these factors, it was assumed that there existed individual differences in learners' characteristics. Then, the cluster analysis identified three distinct groups of learners. Positive attitudes toward ICT and high SRL skills, however, did not necessarily predict the learners' use of ICT or the development of English abilities. Therefore, we must not overestimate the effectiveness of ICT in language learning. We, teachers, should carefully consider the individual differences in learners' characteristics and provide them with the appropriate support and learning materials.

Finally, three limitations need to be considered. First, the validity of the scales was not carefully examined. On one hand, high values of Cronbach's α guaranteed the reliability of each scale (Dörnyei, 2003). On the other hand, the validity of the scales needs refinement. For example, questionnaire items in Kawaguchi and Kusanagi (2016), such as "I like watching DVDs" or "I like listening to CDs," are outdated. Low ratings in the Lai et al. (2015) scale might call into question the validity of using this scale with the Japanese population. Therefore, validity should be assessed by updating the items and conducting similar surveys. Second, TOEIC or TOEIC Tracker might not be the best tool for testing English abilities. In this study, students studied personalized learning materials in an online English course. That is, each student took different English lessons. Since this course was the only one that targeted development of TOEIC-related skills at the university, TOEIC tests were adopted as measures of English abilities. Adopting the tests that reflect the contents of the online course would definitely be the option for future study. Third, other variables such as learners' motivations and learning style preferences also play important roles in the actual use of ICT. Naturally, these variables were influenced by the system we adopted and contents we included in the course. This study was implemented in one of the credit courses and could yield different results under different circumstances where learners study English voluntarily. Therefore, further studies are needed to investigate learners' characteristics across other online learning contexts.

About the Author

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Appendix A

Computer Assisted Language Learning Attitude Scale (Kawaguchi & Kusanagi, 2016)

	Categories	M (SD)	Cronbach's α
	Attitudes toward computer operation (CO)	2.73 (1.02)	.90
CO1	I'm used to using computers.		
CO2	I'm confident in using computers.		
CO3	I don't have any difficulties in using computers.		
CO4	Using computers is not stressful.		
CO5	I often use computers.		
	Social meaningfulness of computer use (SM)	4.71 (0.43)	.79
SM1	Being able to use computers will be a necessary skill in the society from now on.		
SM2	Being able to use computers will be meaningful in my life in the future.		
SM3	In our society, we are asked to use computers well.		
SM4	I would have difficulty job hunting if I couldn't use computers.		
SM5	I want to learn how to use computers before I get a job.		
	The effectiveness of CALL (EC)	3.89 (0.72)	.84
EC1	Learning language online is effective.		
EC2	Learning language on the computer is effective.		
EC3	If we learn language with the computer materials, we could easily acquire the language.		
EC4	A computer is useful in learning the language.		
	The use of Computer-Mediated Communication (CC)	4.34 (1.00)	.93
CC1	I often check Social Networking Services (SNS).		
CC2	I often communicate with my friends via SNS.		
CC3	I often use SNS such as Facebook, Twitter, and LINE.		
	The use of multimedia (MM)	4.28 (0.83)	.78
MM1	I like watching DVDs.		
MM2	I like watching movies.		
MM3	I like listening to CDs.		

Out-of-Class Self-Regulated Learning (Lai et al., 2015)

	Categories	<i>M (SD)</i>	Cronbach's α
	Regulate attitudinal needs (AN)	2.84 (0.88)	.85
AN1	When having negative feelings toward English learning, I use technology to maintain my interest in learning English.		
AN2	I actively use technology to avoid negative feelings towards English learning.		
AN3	I use technology to make English learning more attractive to me.		
AN4	I boost my confidence in English learning through chatting online or reading English materials online.		
AN5	Technology effectively maintains my interest and enthusiasm in learning English. When having doubts on my English progress, I regain confidence in learning through online reading, online chatting or seeking help online.		
AN6	Technology makes me enjoy English learning more.		
	Goal commitment (GC)	3.43 (0.85)	.83
GC1	I believe technology can help me persevere in reaching my ultimate goal of learning English.		
GC2	I believe technology can help me achieve my English learning goals more quickly and efficiently.		
GC3	I encourage myself to achieve my ultimate goals in learning English through using technology to read English information and communicate with English speakers.		
	Metacognition (MC)	2.84 (0.84)	.73
MC1	I check my current English learning level by chatting online or reading online materials.		
MC2	I use technology to set up learning tasks at different stages.		
MC3	For the areas that I'm weak in, I know how to select and use appropriate ICTs to improve the areas.		
MC4	I know how to use ICTs to effectively monitor myself to achieve the learning goals at each stage.		

	Resource needs (RN)	2.81 (1.03)	.90
RN1	I actively seek interesting online English learning materials and experiences.		
RN2	When I feel I need more learning resources in English, I use technology to expand my learning resources.		
RN3	I use technology to expand my English learning experience beyond the language classroom.		
RN4	I use technology to create and increase opportunities to learn and use English.		
RN5	I use technology to make it possible to study English at any time and any place.		
RN6	I use technology to seek help on English from different venues.		
	Social connection needs (SC)	2.09 (1.21)	.93
SC1	I use technology to communicate with English speakers.		
SC2	I use technology to communicate with English learners all over the world.		
SC3	I use technology to seek encouragement and support from English learners all over the world.		

Appendix B. The Characteristics of the Clusters in Each Scale

Variable	Cluster 1 (<i>n</i> = 71)		Cluster 2 (<i>n</i> = 32)		Cluster 3 (<i>n</i> = 17)		<i>df</i>	χ^2	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
CO	2.52a	1.03	3.08a	0.8	2.94	1.17	2	9.09	.01*	.08
SM	4.75	0.32	4.81	0.25	4.39	0.83	2	4.78	.10*	.04
EC	3.75a	0.66	4.32a,b	0.56	3.68b	0.9	2	17.16	<.001*	.14
CC	4.7a	0.39	4.58b	0.57	2.35a,b	1.08	2	39.32	<.001*	.33
MM	4.25a	0.73	4.71a,b	0.39	3.59b	1.26	2	17.09	<.001*	.14
AN	2.65a	0.7	3.68a	0.74	2.05a	0.51	2	44.38	<.001*	.37
GC	3.56a	0.78	4.11a,b	0.64	2.97b	1.01	2	19.19	<.001*	.16
MC	2.52a	0.66	3.73a,b	0.63	2.5b	0.71	2	47.55	<.001*	.40
RN	2.48a	0.86	3.9a,b	0.67	2.12b	0.68	2	52.33	<.001*	.44
SC	1.53a	0.71	3.67a,b	0.81	1.49b	0.78	2	65.65	<.001*	.55

**p* < .01 Means in a row sharing subscripts are significantly different from each other.