

Development of keyboarding skills and complexity, accuracy, and fluency of L2 writing through typed speed writing

SAITO Yukie

タイプ入力によるスピードライティングを通しての キーボードスキルとL2ライティングにおける 複雑さ、正確さ、流暢さの向上

齋藤 雪絵

近年デジタル化が進む一方で、大学生のコンピュータースキル、特に、英語授業の課題や試験をコンピューター上で滞りなく遂行するために必要な第二言語での文字入力スキルは十分ではないとの報告が多い。この現状を踏まえ、タイピング力と英語ライティング力の向上を目的として、2022年秋学期の大学1年生対象の英語ライティング授業内で、10分間のキーボード入力によるスピードライティングを実施した。事前事後に行った英語タイピングテストの結果、学生のタイピング速度は上がっていたことが判明した。さらに、学習者のライティングの複雑さ、正確さ、流暢さを分析したところ、流暢さに大きな伸びが見られたが、短期間の検証においては、複雑さ、正確さにおける変化はほとんど観察されなかった。

Introduction

As most professional writing is computer-mediated, few would disagree that computer skills are essential in this technology-rich society. Generally, English programs at the tertiary level take students' computer skills for granted, requiring them to complete course-related tasks, written assignments, and even exams on the computer (McDonald & Foss, 2007). Typing skills, therefore, are indispensable for academic success. Although a substantial body of research has been conducted to examine the impact of different writing modes – paper-based or computer-based – on test takers'

performance on high-stake English proficiency tests (e.g., Barkaoui, 2014; Brunfaut, Harding, & Batty, 2018), limited attention has been paid to the role of instruction in developing typing skills in second language (L2) settings (Gondree, 2013). Speed writing (also known as timed writing or freewriting) is a conventional writing practice that encourages learners to produce as much text as possible within a specific time limit (Elbow, 1973), and its advantages have been widely reported in the literature (see Saito, 2023). Students are often instructed to handwrite their compositions for limited time (e.g., 10 minutes), yet when conducted on a computer, this activity could serve as typing practice, helping learners improve their keyboarding skills. Hence, the primary purpose of this study is to investigate the impact of speed writing over a semester on L2 learners' typing skills and accuracy. The second purpose is to understand the development of complexity and accuracy in addition to fluency in speed writing. It is because most previous studies on speed writing focused on its effectiveness in enhancing writing fluency (e.g., Farmer, 2020; Hirano, 2022; Hosoda, 2018; Hwang, 2010; Park, 2020), calling for more research on how this pedagogy could help develop different dimensions of L2 writing.

Literature Review

The role of typing skills on L2 writing

With technological advancement and growing computer accessibility, large-scale language test providers have offered computer-based (CB) tests for the last few decades (Brunfaut et al., 2018). This dramatic change has raised some concerns among L2 researchers regarding how different delivery modes (computer vs. paper) would influence test-takers' performance (Barkaoui, 2014) and whether test performance would be affected by examinees' computer skills (Barkaoui, 2014; Barkaoui & Knouzi, 2018), especially in L2 writing. A series of studies have examined the impact of writing mode, keyboarding skills, and overall English language proficiency on test-takers' scores in TOEFL iBT writing tasks (Barkaoui, 2014; Barkaoui & Knouzi, 2018). The research findings have shown that keyboarding skills significantly but weakly affect writing scores. Put differently, unlike English

proficiency, keyboarding skills do not appear to impact test-takers' L2 writing performance on CB tests seriously. Another important finding is that test-takers' L2 writing abilities and keyboarding skills were positively related, suggesting that learners with high L2 writing abilities tend to possess high keyboarding skills. This is probably unsurprising because students with more writing experience, often on the keyboard, likely develop both writing abilities and keyboarding skills (Barkaoui, 2014).

Japanese university students' keyboarding skills

Despite living in a technologically advanced environment, the keyboarding skills of Japanese university students remain relatively low. Frequent use of smartphones and other portable devices for various purposes, including social networking, may not necessarily contribute to developing keyboarding skills required in formal academic settings (Lockley & Promnitz-Hayashi, 2012). It could be because smartphones and computers adopt different input methods; the former is thumb-operated, while the latter is operated with proper finger position on the full-sized keyboard (Gondree, 2013). Some empirical evidence supports the claim that university students are not equipped with typing skills. Son, Park, and Park (2017) conducted two survey studies in different contexts, with English for academic purposes (EAP) students ($n = 100$) at a university in Australia and with English as a foreign language (EFL) students ($n = 70$) at a university in Japan. A majority of Japanese respondents self-rated their keyboarding skills as "acceptable" (56%) or "poor" (27%), and their self-ratings were much lower than those of EAP students. Similarly, the results of other survey studies reported low keyboarding skills among Japanese university students (Kojima, 2014; Mehran, Alizadeh, Koguchi, & Takemura, 2017). In Kojima's (2014) study, most participants had not received adequate typing training. However, on a positive note, he stated that some practice led to a significant improvement in the typing score measured by *e-typing*, a provider of free online typing tests.

Some researchers have observed a lack of typing skills among Japanese students in English writing classes, where they are required to

submit typed manuscripts, not handwritten compositions (Gondree, 2013; McDonald & Foss, 2007, 2009). They argue that students' limited typing proficiency negatively influences their writing performance. Such adverse effects can be explained based on cognitive models of writing, in which writing is regarded as a set of complex processes within limited cognitive resources (Torrance & Galbraith, 2006). For learners with poor typing skills, extra time and energy are used for motor activities (e.g., finding the right keys), leaving little cognitive resources for high-order processes such as planning and editing, which can result in poor quality writing produced (Barkaoui, 2014).

Only a handful of studies have explored the effectiveness of typing instruction on students' performance in L2 contexts. McDonald and Foss (2007) examined the changes in typing speed and accuracy of first-year university students over a semester by dividing them into three groups: a high attention group, a low attention group, and a control group (i.e., no direct attention to typing). Both the high attention and low attention groups received 15-20 minutes of explicit typing instruction and practice every week. The instruction introduced basic principles of touch typing, illustrated home row keys, and displayed correct finger placement for each key. The two groups differed in the total amount of training, with ten weeks for the high attention group and five for the low attention group. Though all the groups improved typing speed and accuracy, the high attention group showed the "most substantial" improvement. As it was a preliminary study with no statistical analysis, the researchers could not draw conclusions regarding the effectiveness of explicit typing instruction. Their follow-up study (McDonald & Foss, 2009) found that most participants, even including those in the control group, improved their English typing speed and accuracy over a year. In-class typing training and practice did not result in statistically significant differences between the high attention group and the control group. The questionnaire results, however, showed that the participants viewed the class time allocated to typing training positively, which might have impacted students' perceived typing skills and their attitudes toward English typing.

Explicit typing training, as employed in the two studies mentioned above (McDonald & Foss, 2007, 2009), is one practical approach. However, not all learners may equally benefit from such systematic instruction because there are different approaches and strategies to achieve sufficient keyboard fluency (Grabowski, 2008). Grabowski (2008) scrutinized various factors involved in keyboard operation among university students and concluded that learners with high keyboard skills did not behave in the same way as professional typists “who master a ten-finger touch-typing method with the highest perfection and without any need of visual keyboard control” (p. 49). From the finding, it can be inferred that students might appreciate freedom in selecting typing training and instruction suitable for their needs. Considering Grabowski’s (2008) finding that experienced typists have developed their keyboard strategies, Gondree (2013) reported implementing different activities to foster English learners’ typing fluency. He introduced free online typing exercises and games, strongly encouraging students to try them regularly, required them to type all the course-related assignments, and provided them with computer-based writing tasks in the classroom. The researcher called for future studies to investigate the most effective methods for developing English learners’ typing skills.

When conducted on the computer, speed writing, a commonly used classroom activity that encourages writers to write freely without being concerned with formal accuracy within a fixed time limit (Elbow, 1973) has the potential to develop L2 learners’ keyboarding skills as well as L2 writing abilities. It is because this activity provides learners with regular exposure to typing on the keyboard, which is the key to developing their keyboard fluency and familiarity. Hirano (2022) examined the effect of typed timed writing on Japanese university students’ ($N = 19$) L2 writing fluency measured by the total number of words produced in 10 minutes. The finding showed that the average number of words in the posttest (88.7 words) was significantly different from that in the pretest (48.8 words) with a large effect size; however, the study did not investigate the effect of timed writing on their keyboarding skills, which is one of the gaps that the present study addresses.

Capturing L2 writing development

In the field of second language acquisition, researchers have adopted the framework of complexity, accuracy, and fluency (CAF) to examine the multifaceted dimensions of L2 proficiency. CAF has been used in various contexts as descriptors for oral and written assessment, indicators of L2 proficiency or language development (Housen & Kuiken, 2009). The definitions of the three constructs vary widely, but complexity is associated with size, elaborateness, richness, and diversity of a learners' L2 linguistic system (Housen & Kuiken, 2009). Accuracy is defined as "a writer's ability to produce language that is free of language errors at the word and sentence level", and it is usually measured by error counts, for example, the number of error-free t-units (Casanova, 2004, p. 68). A t-unit is a "minimal terminable unit" consisting of an independent clause and any attached subordinate clauses (Hunt, 1965, p. 21). Fluency is defined as a writer's "ability to produce a lot of language without excessive hesitations, blocks, and interruptions" (Casanova, 2004, p. 67). It is often operationalized by the number of words a writer can produce within a limited time (Wolfe-Quintero, Inagaki, & Kim, 1998). L2 writers are expected to produce more complex, more accurate, and more fluent texts (Barrot & Agdeppa, 2021). In other words, one essential goal in L2 writing is to produce error-free compositions with high lexical and syntactic complexity without immoderate hesitations.

CAF can be used as an index of language proficiency. Barrot and Agdeppa (2021) examined more than 5000 academic essays from the international corpus to identify CAF measures that could differentiate writers' language proficiency levels. As a result, they identified complexity measures (e.g., the length of production and degree of phrasal sophistication) and words per text as best proficiency indicators.

The CAF framework is effective in longitudinally exploring non-linear, complicated writing processes (Doe & Figueroa, 2015; Hokamura, 2018; Nitta & Baba, 2014). A study by Nitta and Baba (2014) examined the development of 46 students' freewriting over a 30-week academic year with various CAF measures. The study examined syntactic and lexical complexity and fluency but not accuracy because the emphasis on accuracy during the activity was

considered to be inconsistent with the primary purpose of freewriting in that priority should be given to fluency and content generation. Results revealed that overall, students improved complexity and fluency of their writing over a year. They followed different developmental patterns and tended not to focus on all aspects simultaneously. Similarly, Doe and Figueroa's (2015) study looked at the development of CAF features in university students' freewriting. However, their main focus was to examine how the mode of planning, either speaking or writing, would influence learners' production. Results revealed few differences between students in the two planning conditions. Though the majority of changes were insignificant, the participants improved the CAF aspects; they wrote more words with longer t-units and fewer grammatical mistakes.

The tendency to prioritize certain CAF aspects over others demonstrated in Nitta and Baba's (2014) study was also found in a more recent investigation by Hokamura (2018). The study examined the CAF development in academic essays of two Japanese university students and reported that the three CAF constructs were not positively correlated, but two of them (fluency & accuracy, fluency & complexity) were. The finding is supportive of the Trade-Off hypothesis that all three CAF dimensions are unlikely to develop simultaneously and that "fluency can be accompanied by accuracy, or complexity, but not both" (Skehan, 2009, p. 512).

Despite a number of studies on the effects of speed writing on fluency (e.g., Farmer, 2020; Hirano, 2022; Hosoda, 2018; Hwang, 2010; Park, 2020), research on how complexity and accuracy may develop through this practice is still limited. Following previous research (Doe & Figueroa, 2015; Nitta & Baba, 2014), the present study looks at the development of CAF features in university students' typed speed writing over a semester.

Purpose of the Study

The purpose of the study is twofold. Addressing the dearth of research on the instruction and pedagogical activities in developing L2 keyboarding skills, the present study examines the development of Japanese university students' keyboarding skills through 10-minute typed speed

writing. In addition, the present study explores the development of CAF aspects in students' speed writing over one academic semester, as most previous studies on speed writing investigated its effectiveness in developing writing fluency, calling for more research that looks at different dimensions of writing development.

- (1) How does 10-minute speed writing help Japanese university students develop keyboarding skills?
- (2) How do Japanese learners of different proficiency groups develop complexity, accuracy, and fluency in their typed speed writing over a semester?

Method

Participants

This study was conducted during the 2023 fall semester at a private university in Japan. Participants of the study ($N = 34$) were drawn from two first-year academic writing classes taught by the author. The two classes differed in English language proficiency (ELP) measured by the online TOEIC test the students had taken before entering the university. One class (referred to as low ELP, $n = 16$) was intermediate-mid, with an average TOEIC score of 409.38 (range 245-490), while the other class (high ELP, $n = 18$) was advanced, with an average score of 686.22 (range 620-800). The low ELP class was conducted in a computer room, but some preferred using their computers. The high ELP class was conducted in a regular classroom; each student was asked to bring a computer for every class. They met once a week for 100 minutes for fourteen weeks.

Speed Writing

In total, fourteen 10-minute speed writing sessions were administered on the keyboard. In the first and last weeks, students wrote about the same topic, *my hobby/hobbies*, and their compositions served as the pre-writing and post-writing. As shown in Table 1, in Weeks 2-13, students were given a broad theme (e.g., *university*) with two choices: a personal topic (e.g., *my*

university life) and a general topic (e.g., *university entrance examination*). Overall, personal topics were much more popular than general ones in both groups; as an exception, one student in the high ELP class continuously chose a general topic every week. Students were instructed to choose a topic, think about it silently for one minute, and write as many words as possible without worrying about spelling, vocabulary, and grammar.

Table 1. Topics in Speed Writing

Week	Theme	Personal Topic	General Topic
1	Hobby	My hobby/hobbies	
2	University	My university life	University entrance exam
3	Job	My part-time job(s)	Characteristics of a good job
4	Food	My favorite food	Food waste
5	English	My English classes in high school	English education in Japan
6	Going abroad	A country I want to visit	Benefits of studying abroad
7	Technology	My smartphone	Advances in technology
8	Environment	How eco-friendly am I?	Global warming
9	Family	My family	Decreasing birthrate
10	Friendship	My best friend(s)	Qualities of a good friend
11	Travel	My best travel experience	Benefits of travelling
12	Future	My future dream	The world in 10 years
13	Happiness	What makes me happy	What makes the world a better place
14	Hobby	My hobby/hobbies	

Typing tests

Typing sessions were administered at the semester' beginning (Week 1) and end (Week 14). In each session, the participants completed two one-minute online typing tests freely available on *Typing Test Pro* (<https://pro.typingtest.com/>), a website that helps create online tests for educational and

business purposes and is adopted in previous research (Barkaoui, 2014). After the quick demonstration, the students were asked to type the text, displayed at the upper part of the screen, into a blank form as fast and correctly as they could. They were allowed to use backspace to correct their typing mistakes. Most students had not taken online typing tests in English, feeling uneasy about the tests. Therefore, the first trial served as a practice, and the result of the second test was used as the data. Of the following measures of typing proficiency that the test offered, net speed, which is the adjusted number of words per minute, and accuracy were examined in the data analysis.

- Gross speed: the number of words typed per minute (WPM)
- Errors: the number of words typed incorrectly
- **Net speed**: the number of words correctly typed per minute (adjusted WPM)
- **Accuracy**: the percentage of words typed accurately out of all the typed words

Measures of Complexity, Accuracy, and Fluency

Students' pre- and post-speed writing compositions were saved as Microsoft Word files and analyzed in the CAF framework. Various measures of complexity have been proposed, yet in this study, it was operationalized by the mean length of t-units and the number of dependent clauses per t-unit as they are most frequently used in the SLA research and are suitable for examining clausal elaboration and embedding (Mazgutova & Kormos, 2015). T-unit, which has been widely used to analyze spoken and written discourse in the SLA, is defined as "one main clause with all subordinate clauses attached to it" (Hunt, 1965, p. 20). Accuracy was measured by the error-free t-unit ratio. Measuring accuracy was a challenge as most compositions, especially from the low ELP group, were ungrammatical. Generally, written errors can be classified into global and local errors, focusing on their communicative importance (Burt, 1975). Global errors (e.g., wrong word order and wrong, misplaced, or missing sentence connectors) tend to "affect

overall sentence organization” (Burt, 1975, p. 56), whereas local errors do not significantly hinder text comprehension. Because of the ungrammatical nature of students’ writing, only global errors were counted as errors in the analysis. This lenient approach to identifying errors was considered appropriate because some texts, especially from low-proficiency learners, did not contain any t-unit free from grammatical mistakes. Although the global/local distinction is not fixed but rather context-dependent (Tran, 2013), examples of local errors include noun and verb inflections, articles, prepositions, and auxiliaries (Burt, 1975; Touchie, 1986). Finally, fluency was operationalized by the total word count in each text, as this measure has been used in previous studies on speed writing (Doe & Figueroa, 2015; Hosoda, 2018. Nitta & Baba, 2014).

The CAF analyses were conducted in the following procedure. Complexity and accuracy were measured manually by the author. First, six samples from the low and high ELP groups were analyzed to establish a guideline for coding. Following it, the author proceeded with the analysis of the remaining data. As for errors, noun inflections (many student*/students), verb inflections for third-person singular verb ending (she like*/likes), S-V agreement (e.g., students is*/are), use of articles (student*/a student) in addition to spelling and punctuation errors were interpreted as local errors and were not counted as “errors” in the analysis. Regarding fluency, the total number of words for each text was obtained automatically on a Word document. Words written in Japanese (e.g., トルコ for *Turkey*) were excluded from the total word count. For example, the sample text below includes three t-units, three error-free t-units, and two dependent clauses (underlined).

Sample

My hobby is dancing. [no errors]

Since I was elementary school student, I have been practicing it. [article error = no errors]

When I was in elementary school and junior high school, I went to a dance school. [no errors]

Data Analyses

To examine the development of typing skills and the CAF features in speed writing, statistical analyses were conducted using SPSS version 29.0 for Windows. Data screening showed that the assumption of normality was satisfactory. The paired-samples *t*-test was conducted for the pre-post difference, and the independent-samples *t*-tests was run for the group difference. The effect size, reported as a *d* value, was calculated, and *d* values of .2, .5, and .8 were interpreted as small, medium, and large effect sizes (Green & Salkind, 2010).

Results

Improvement in Keyboarding Skills

Tables 2 and 3 summarize the descriptive and inferential statistics of typing speed and accuracy. On the pre-test, the net speed averages of the two groups were relatively low (below a benchmark of 35 words per minute suggested by Gondree, 2013), while accuracy rate averages were high (above 92%). Net speed on the pre-test was significantly correlated with overall English language proficiency measured by TOEIC ($r = .39, p < .05$) and differed between the low and high ELP groups ($t = 2.81, p < .01$).

Next, the paired samples *t*-test was conducted for two variables (i.e., net speed and accuracy) for each group; using a Bonferroni adjustment, the significant level was set at $p = .025$ (i.e., $.05/2$). The results revealed that both groups significantly improved their net speed: low ELP ($t = 4.09, p < .001$) and high ELP ($t = 3.15, p < .01$). The *d* values for low and high ELP groups were 1.02 and .74, which can be interpreted as a large and a medium effect size, respectively. The groups did not improve their accuracy ratio: low ELP ($t = 1.02, p = .16$) and high ELP ($t = -.52, p = .61$). On the whole, the participants, regardless of their overall ELP, gained significant improvement in their typing speed at the end of the semester, and the gain was more substantial for the low ELP group.

Table 2. Descriptive Statistics for Typing Speed and Accuracy

Measures	Low ELP				High ELP			
	Pre-test		Post-test		Pre-test		Post-test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Net speed WPM	20.94	1.60	24.75	1.31	28.00	1.90	31.44	1.52
Accuracy (%)	93.44	1.59	94.94	1.07	92.39	1.50	91.78	1.52

Table 3. Results of Paired-samples *T*-tests for the Changes in Typing Speed and Accuracy

Measures	Low ELP			High ELP		
	<i>t</i>	<i>p</i>	<i>d</i>	<i>t</i>	<i>p</i>	<i>d</i>
Net speed WPM	4.09	< .001*	1.02	3.15	.003*	0.74
Accuracy (%)	1.02	.16	0.25	-0.52	.61	0.12

Note. Asterisks indicate statistical significance.

CAF Development

Results of descriptive and inferential statistics for CAF measures were reported in Tables 4 and 5. In the pre-writing, the high ELP group wrote significantly more words (126.61 words) than the low ELP group (85.88 words): $t = 3.84$, $p < .001$. Although the differences in the other three measures were not statistically significant, the high ELP group tended to use more dependent clauses and produce fewer grammatical errors than the low ELP group. Most errors for the high ELP group were concerned with prepositions (e.g., **in these days* instead of *these days*) and wrong word choices (e.g., **seeing soccer* instead of *watching soccer*). In contrast, those for the low ELP group were mostly syntactical errors that could considerably impede the understanding of the text (e.g., *My hobbies are *gone to live and sleeping* instead of *My hobbies are going to concerts and sleeping*). The average number

of dependent clauses per t-unit remained low for both groups. Most dependent clauses used by the low ELP group were adverbial clauses with *when* and *because*, with fewer variations. In contrast, several students in the high ELP group demonstrated a variety of dependent clauses, including adjective clauses with relative pronouns in the pre-writing.

To examine the pre-post changes in the CAF measures, four paired samples *t*-tests were conducted for each group, with a significant level set at $p = .013$ (i.e., $.05/4$). As for the two complexity measures, neither of the groups showed statistically significant development. However, the average mean length of t-unit for the high ELP group improved from 8.78 to 9.61, indicating they were able to produce longer t-units on the post-writing. The average number of dependent clauses per t-unit for each group remained unchanged. Although neither of the groups significantly improved accuracy, they increased the mean of error-free t-unit ratio. The high ELP group, especially, improved from 0.74 to 0.81. Fluency, measured by the total number of words produced in 10 minutes, statistically improved for both groups with large effect sizes: low ELP ($t = 5.54, p < .001, d = 1.38$) and high ELP ($t = 0.86, p < .001, d = 0.86$).

Table 4. Descriptive Statistics for CAF Measures

Measures	Low ELP				High ELP			
	Pre-writing		Post-writing		Pre-writing		Post-writing	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Mean length of t-unit	8.34	0.29	8.73	0.55	8.78	0.46	9.61	0.34
D clauses per t-unit	0.17	0.04	0.20	0.03	0.26	0.04	0.28	0.03
Error-free t-unit ratio	0.64	0.05	0.69	0.03	0.74	0.04	0.81	0.02
Total word count	85.88	5.39	120.19	8.91	126.61	8.48	151.83	8.21

Table 5. Results of Paired Samples *T*-tests for the Changes in CAF Measures

Measures	Low ELP			High ELP		
	<i>t</i>	<i>p</i>	<i>d</i>	<i>t</i>	<i>p</i>	<i>d</i>
Mean length of t-unit	1.03	.16	0.26	1.89	.04	0.45
D clauses per t-unit	0.72	.24	0.18	0.56	.29	0.13
Error-free t-unit ratio	0.94	.18	0.23	1.45	.08	0.35
Total word count	5.54	< .001*	1.38	3.66	< .001*	0.86

Note. Asterisks indicate statistical significance.

Discussion

The first research question that the present study addresses concerns the potential of typed speed writing to develop learners' L2 typing skills. As reported in previous studies on Japanese university students' keyboarding skills (McDonald & Foss, 2007, 2009; Gondree, 2013), the participants in this study were not fluent typists on the pre-test, with the average net speed of 20.94 and 28.00 for the low and high ELP groups, respectively. Their high accuracy ratio (above 90% for both groups) indicated the tendency to type each word carefully at the cost of typing speed. On the post-test, students in both groups significantly improved their typing speed. However, the results should be interpreted with caution as the lack of a control group in the study makes it difficult to examine the extent to which typed speed writing contributed to typing speed development. McDonald and Foss (2009) found that even a control group who did not receive explicit typing instruction improved their typing speed and accuracy, possibly because of the increased opportunities to type in English.

Nevertheless, students appeared to appreciate regular typing practice implemented as typed speed writing. To gauge students' perceptions toward typing skills and speed writing, the author conducted a follow-up questionnaire in Week 14. According to the results, they unanimously acknowledged the importance of typing skills in academia and in the future workplace. All the participants, except one, believed that weekly speed

writing on the keyboard helped them improve their typing skills. Some students commented that they used only one finger to type on the pre-test, but on the post-test, they could type with all fingers.

The present study demonstrates that typed speed writing can be beneficial for giving L2 learners opportunities to type on the keyboard as fast as possible, consequently improving their typing speed. Unlike the participants in McDonald and Foss's (2007, 2009) studies, those in this study did not receive explicit typing instructions (e.g., correct finger placement); however, they appeared to develop their own typing strategies as they engaged in weekly speed writing on the keyboard. In addition to the benefits for L2 learners, typed speed writing has some practical advantages for teachers and researchers, compared to handwritten speed writing. First, the word count is automatically generated on a Word document, allowing teachers to trace the history of learners' writing improvement easily. Second, researchers can be exempted from the extra work of typing or scanning students' handwritten compositions into a word processor before proceeding with any data analysis.

Regarding the second research question, which addresses the development of different dimensions in L2 writing, the students in this study significantly improved fluency with large effect sizes regardless of their language proficiency. The students in the high ELP group reduced the error-free t-unit ratio and increased the mean length of t-unit, although their changes were insignificant. Results indicate that fluency development could occur even in a short period, as reported in previous studies (Farmer, 2020; Hirano, 2022; Hosoda, 2018; Park, 2020), whereas the development of complexity and accuracy is a more gradual process. SLA research has shown that language acquisition occurs gradually, following a U-shaped course of development; learners use a correct target form at one stage, replace it with an ungrammatical form, and finally use it correctly (Ellis, 1997). The participants in this study did not receive teacher feedback on their speed writing compositions, but they did on their written course assignments. The teacher gave direct feedback on global errors (e.g., wrong word choice, sentence structure), and the students were asked to correct

them in their revised draft. However, as research on corrective feedback has shown (Hyland & Hyland, 2006), it might have been challenging for L2 learners, especially low-proficiency students, to utilize the feedback and use correct forms on a new piece of writing. The same applies to explaining complexity development. In the meta-analysis on syntactic measures and L2 proficiency by Ortega (2003), large effect sizes for syntactic development were observed in longitudinal studies, while effect sizes for short periods (i.e., less than three months) were limited to “negligible” and medium changes (p. 510). It should be noted that the previous study that observed lexical and syntactic complexity development in freewriting (Nitta & Baba, 2014) was a longitudinal investigation over one academic year. Taken together, students could benefit from typed speed writing in developing the CAF aspects of their writing, especially fluency; the effects could be more significant if they engage in the activity for a more extended period.

Conclusion

The present study examined the development of first-year Japanese university students’ keyboarding skills and CAF features through typed speed writing over a 14-week semester. Despite the government’ emphasis on digitalizing education in elementary and secondary schools through GIGA school program, which ensures one computer for one student with a high-school network (announced by Ministry of Education, Culture, Sports, Science, and Technology in December 2019), first-year university students’ typing skills are still limited. Students may benefit from speed writing on the keyboard as this practice exposes them to regular typing. Results of this study also suggest that students tend to improve fluency for a short time, while their complexity and accuracy development follows a more gradual pattern.

While the current study goes a long way in addressing the potential of typed speed writing as typing practice and exploring how students develop different dimensions of their writing over a semester, some limitations should be acknowledged. First, there was no control group, and the participants were drawn from two intact classes, which may have

weakened the validity of the findings. This calls for more studies with a rigorous experimental design with a larger sample size. Moreover, CAF was operationalized by four measures: two for complexity and one for accuracy and fluency in this study. However, finer analyses of students' writing with various measures could have captured their writing development more accurately. The coding and analyzing for CAF was conducted solely by the author. Employing a second rater could have increased the reliability of the analysis. Nevertheless, the findings of this study show that typed speed writing can be effective in developing students' typing skills and CAF features, although its effects should be examined longitudinally since the development of complexity and accuracy takes place gradually.

References

- Barkaoui, K. (2014). Examining the impact of L2 proficiency and keyboarding skills on scores on TOEFL-iBT writing tasks. *Language Testing, 31* (2), 241-259.
- Barkaoui, K., & Knouzi, I. (2018). The effects of writing mode and computer ability on L2 test-takers' essay characteristics and scores. *Assessing Writing, 36*, 19-31.
- Barrot, J. S., & Agdeppa, J. Y. (2021). Complexity, accuracy, and fluency as indices of college-level L2 writers' proficiency. *Assessing Writing, 47*, 100510.
- Brunfaut, T., Harding, L., & Batty, A. O. (2018). Going online: The effect of mode of delivery on performances and perceptions on an English L2 writing test suite. *Assessing Writing, 36*, 3-18.
- Burt, M. K. (1975). Error analysis in the adult EFL classroom. *TESOL Quarterly, 9* (1), 53-63.
- Casanova, C. P. (2004). *Controversies in second language writing: Dilemmas and decisions in research and instruction*. Ann Arbor, MI: University of Michigan Press.
- Doe, T., & Figueroa, A. (2015). Planning activities and freewriting. In P. Clements, A. Krause, & H. Brown (Eds.), *Focus on the learner*. Tokyo: JALT.
- Elbow, P. (1973). *Writing without teachers*. New York, NY: Oxford University Press.
- Ellis, R. (1997). *Second language acquisition*. Oxford, UK: Oxford University Press.
- Farmer, J. A. (2020). Using freewriting to increase student written fluency. *The Journal of Rikkyo University Language Center, 43*, 3-12.
- Gondree, E. (2013). Problems of computer keyboarding in an EFL context. *OnCUE Journal, 7* (3), 176-183.
- Grabowski, J. (2008). The internal structure of university student's keyboard skills. *Journal of Writing Research, 1* (1), 27-52.
- Green, S. B., & Salkind, N. J. (2010). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (6th ed.). Upper Saddle River, NJ: Prentice Hall.

- Development of keyboarding skills and complexity, accuracy, and fluency of L2 writing through typed speed writing
- 平野亜也子. (2022). 「キーボード入力による Timed Writing が日本人英語学習者のライティングの流暢さと動機づけにおよぼす影響」『京都産業大学論集 人文科学系列』55号, 25-45.
- Hokamura, M. (2018). The dynamics of complexity, accuracy, and fluency: A longitudinal case study of Japanese learners' English writing. *JALT Journal*, 40(1), 23-46.
- Hosoda, N. (2018). Effects of speedwriting and task repetition on the development of writing fluency. *The Language and Media Learning Research Center Annual Report*, 27-47.
- Housen, A., & Kuiken, F. (2009). Complexity, accuracy, and fluency in second language acquisition. *Applied Linguistics*, 30(4), 461-473.
- Hunt, K. (1965). *Grammatical structures written at three grade levels*. NCTE Research Report No. 3. Champaign, IL: NCTE.
- Hwang, J. (2010). A case study of the influence of freewriting on writing fluency and confidence of EFL college-level students. *Second Language Studies*, 28(2), 97-134.
- Hyland, K., & Hyland, F. (2006). Feedback on second language students' writing. *Language Teaching*, 39(2), 83-101.
- 児島完二. (2014). 「大学初年次におけるタイピング能力の現状」『2014 PC CONFERENCE』94-97.
- Lockley, T., & Promnitz-Hayashi, L. (2012). Japanese university students' CALL attitudes, aspirations and motivations. *CALL-EJ online*, 13(1), 1-16.
- Mazgutova, D., & Kormos, J. (2015). Syntactic and lexical development in an intensive English for Academic Purposes programme. *Journal of Second Language Writing*, 29, 3-15.
- McDonald, K., & Foss, P. (2007). A look at first-year students' English typing abilities. *OnCUE Journal*, 1(1), 55-63.
- McDonald, K., & Foss, P. (2009). Another look at first-year students' English typing abilities. *OnCUE Journal*, 3(1), 48-66.
- Mehran, P., Alizadeh, M., Koguchi, I., & Takemura, H. (2017). Are Japanese digital natives ready for learning English online? A preliminary case study at Osaka University. *International Journal of Educational Technology in Higher Education*, 14, 1-17.
- Nitta, R., & Baba, K. (2014). Task repetition and L2 writing development: A longitudinal study from a dynamic systems perspective. In H. Byrnes & R. M. Manchón (Eds.), *Task-based language learning – Insights from and for L2 writing* (pp. 107-136). Amsterdam, the Netherlands: Benjamins.
- Ortega, L. (2003). Syntactic complexity measures and their relationship to L2 proficiency: A research synthesis of college-level writing. *Applied Linguistics*, 24, 492-518.
- Park, J. (2020). Benefits of freewriting in an EFL academic writing classroom. *ELT Journal*, 74(3), 318-326.
- Saito, Y. (2023). Exploring the potential role of speed writing activities in academic writing courses. *Dokkyo Journal of Language Learning and Teaching*, 11, 59-73.
- Skehan, P. (2009). Modelling second language performance: Integrating complexity, accuracy, fluency, and lexis. *Applied Linguistics*, 30(4), 510-532.
- Son, J. -B., Park, S. -S., & Park, M. (2017). Digital literacy of language learners in two

different contexts. *JALT Call Journal*, 13(2), 77-96.

Torrance, M., & Galbraith, D. (2006). The processing demands of writing. In MacArthur, C. A., Graham, S., & Fitzgerald, J. (Eds.), *Handbook of writing research* (pp. 67-80). New York, NY: The Guilford Press.

Touchie, H. Y. (1986). Second language learning errors: Their types, causes, and treatment. *JALT journal*, 8(1), 75-80.

Tran, T. H. (2013, October). *Approaches to treating student written errors*. Paper presented at MIDTESOL, Lawrence, KS.

Wolfe-Quintero, K., Inagaki, S., & Kim, H-Y. (1998). *Second language development in writing: Measures of fluency, accuracy, and complexity. Technical Report No. 17*. Honolulu: Second Language Teaching and Curriculum Center, University of Hawai'i at Manoa.