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Exploring the effects of Grammarly on EFL students' foreign language anxiety and learner autonomy

Gilbert Dizon

Himeji Dokkyo University, Japan
gilbert.dizon.jr@gmail.com

Jason Gold

Kobe University, Japan
jason.gold@gold.kobe-u.ac.jp

There is a rich body of literature that details the effects of automated writing evaluation (AWE) on second language (L2) students. However, these studies mostly focus on the impact that automated feedback has on writing performance, i.e. that is, there is a dearth of research on its influence on affective factors. Hence, this study was conducted to fill this gap in the literature. The study explored the impact of Grammarly, a popular AWE tool, on English as a foreign language (EFL) students' foreign language anxiety (FLA) and learner autonomy (LA). EFL students in four separate academic writing courses (N = 58) taught by one of the researchers at a public Japanese university participated in the study. The students received training on Grammarly at the start of the Fall 2022 semester and were required to use the tool while editing their English writing during the 16-week course. Pre- and post-surveys were administered to measure the effects that Grammarly had on FLA and LA. Qualitative data in the form of written reflective reports was also collected from the participants to gain deeper insight into their perceptions of Grammarly to improve their writing. Results from the analyses indicated that Grammarly had a significant positive effect on both FLA and LA. The students also had largely positive perceptions toward Grammarly as an English writing tool. These findings have important implications for the L2 writing classroom and demonstrate that AWE can be used to reduce anxiety and promote autonomy among language learners.

Keywords: second language writing; automated writing evaluation; automated feedback; language anxiety; learner autonomy; artificial intelligence

Introduction

Unsurprisingly, foreign language anxiety (FLA) has been found to have a negative impact on language learning outcomes (GhorbanDordinejad & Nasab, 2013; Hu et al., 2021). Studies indicate that there is also a significant relationship between learner autonomy (LA) and learning achievement among second language (L2) learners (Ozer & Yukselir, 2021). More specifically, in the context of L2 writing, research has shown that both FLA and LA influence L2 writing performance (Tahmouresi & Papi, 2021; Zabihi, 2018). Considering this, teachers should take steps to alleviate FLA and promote LA in the L2 writing classroom. One way to do this is to incorporate computer-assisted language learning (CALL), as technology has the potential to reduce FLA and increase LA in L2 learners. Digital resources and tools such as automatic speech recognition (ASR) (Bashori et al., 2021), gaming (Yang et al., 2022), robot-assisted language learning (RALL) (Alemi et al., 2015), and virtual reality (VR) (Thrasher, 2022; York et al., 2021) have demonstrated the ability to reduce foreign language-related anxiety. CALL research indicates that technology can also assist in enhancing LA. In this regard, mobile-assisted language learning (MALL) (Sato et al., 2020), massive open online courses (MOOCs) (Ding & Shen, 2022), videoconferencing (Lenkaitis, 2020), and ASR (McCrocklin, 2016) have all been shown to be effective.

Gayed et al. (2022) posit that automated writing evaluation (AWE), the use of automated systems that provide personalized feedback, can reduce learners' cognitive load when writing in a L2. In other words, the researchers assert that AWE allows learners to spend less working memory on lower-level writing tasks (e.g., spelling, grammar, punctuation, translation) and thus more time on higher-level tasks such as writing content and organization. Considering that other technologies reduce the cognitive load of L2 learners, which in turn, positively influences FLA and LA (Chen et al., 2022; Tonkin et al., 2019), it seems plausible that AWE could have similarly positive effects on the FLA and LA of L2 learners. However, while many studies have explored the impact of AWE on L2 writing performance, far fewer studies have measured the influence of these tools on FLA and LA (Fu et al., 2022). As a result, this study fills this gap in the research by investigating the impact of Grammarly, a popular AWE tool, on English as a foreign language (EFL) students' FLA and LA in the L2 writing classroom. To this end, Japanese university EFL students taking a L2 English academic writing class were trained in the use of Grammarly and were required to use the AWE tool over the course of a 16-week semester. Data was collected in the form of pre- and post-surveys as well as written reflective reports. Using these data sources, the researchers evaluated the students' attitudes toward Grammarly in the context of FLA and LA to better understand the affordances and constraints of the AWE tool.

Foreign language anxiety

Horwitz et al. (1986) define FLA as “a distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language learning process” (p. 128). There is a general consensus that a strong negative correlation exists between FLA and L2 performance (Zhang, 2019). Given the significance of FLA in L2 learning, Horwitz et al. (1986) developed the Foreign Language Classroom Anxiety Scale (FLCAS) to measure the specific anxiety that arises when students learn or use a L2. Since its development, the FLCAS has become the most widely used instrument to assess FLA in L2 learning contexts, with FLCAS studies indicating that approximately 30–40% of L2 learners experience at least moderate levels of FLA (Horwitz, 2016).

CALL research indicates that technology can alleviate FLA among L2 learners. For instance, York et al. (2021) revealed that VR led to a significant decrease in FLA among EFL learners in Japan. Thrasher (2022) had similar results involving the use of VR with L2 French learners; the participants in her study demonstrated lower FLA in VR than in a traditional classroom environment. In a study involving EFL learners in Indonesia, Bashori et al. (2021) found that students who used ASR could not only increase their vocabulary knowledge to a greater degree than the control group, but they also had lower levels of FL speaking anxiety. This mirrors the results found by Yang et al. (2022), who investigated the impact of an online game on FLA and English vocabulary learning among young EFL learners in Taiwan. Based on their findings, the EFL learners who used the online game had lower levels of FLA and made greater vocabulary gains than those who learned in a face-to-face classroom environment. The use of robots has also been shown to be an effective way to decrease FLA. Alemi et al. (2015) compared the FLA of Iranian EFL learners who used RALL and those who studied English in a traditional environment. The researchers' analyses indicated that RALL had a greater positive effect on FLA than traditional instruction.

Learner autonomy

In addition to FLA, LA is an important factor in L2 performance. LA refers to the ability of a learner to take charge of different aspects related to their language learning (Benson, 2013). In the context of the L2 classroom, LA is important because “when students are given part of the responsibility of their own learning, they become more engaged in the process, which in turn allows them to be more effective in the short- and long-term” (Lenkaitis, 2020, p. 486). Considering its significance, Little (2007) suggests three principles to promote LA among L2 learners: learner involvement, learner reflection, and target language use. Learner involvement entails encouraging learners to actively participate in the language learning process, e.g., setting goals or evaluating performance. Learner reflection involves the incorporation of explicit reflection



activities which promote metacognitive processes, particularly in the form of dialogue between groups of learners and/or the teacher and learners. Target language use is self-explanatory, i.e., learners should be encouraged to use the L2 whenever possible, both during class as well as for out-of-class activities.

There is a strong body of literature that shows CALL can successfully support LA. Results from McCrocklin (2016) revealed that English as a second language (ESL) students at an American university were able to make significant gains in LA through the use of ASR for pronunciation training. Lee's (2011) study on blogs demonstrated that the Web 2.0 platform could promote LA among L2 Spanish learners who were studying abroad. Using a survey-based research design, Sato et al. (2020) found that MALL led to higher motivation levels among Japanese EFL learners, which in turn, positively influenced LA. Videoconferencing is another digital resource that has been found to be beneficial for LA. Lenkaitis (2020) utilized videoconferencing software, namely Zoom, to create autonomous learning spaces for the L2 Spanish students in her research. Results from the study indicated that Zoom promoted LA as it encouraged the students to be responsible for their own learning in order to communicate with their peers in a less structured environment. In a recent study, Ding and Shen (2022) explored the use of MOOCs and their influence on LA among Chinese EFL learners. According to their interview-based analysis, the researchers concluded that MOOCs help support LA by encouraging learners to utilize different metacognitive, motivation control, and emotion control strategies. Hafner and Miller (2011) adopted a novel method to promote L2 autonomy. They used a student-centered approach by grounding in-class activities in the learners' existing digital literacy practices. The study highlighted the importance of incorporating students' own digital literacy practices in classroom-based L2 learning settings.

Automated writing evaluation

Given the significance of FLA and LA in the context of L2 learning, it is important to consider the role of digital technologies such as AWE in influencing these affective variables. AWE is software that provides automated feedback based on natural language processing and artificial intelligence (AI) (Mohsen, 2022). Popular AWE systems include Criterion, IntelliMetric, iWrite, and Pigai (Zhang, 2021). According to Zhang, AWE offers several advantages over corrective feedback from teachers or peers. First, AWE saves teachers time as providing individual students corrective feedback is often very time-consuming. Relatedly, the use of AWE increases teaching efficiency since AWE feedback is instantaneous, thus allowing teachers the ability to focus on other areas of instruction. Lastly, AWE supports a learner-centered environment given that the teacher is no longer required to provide as much corrective feedback, which encourages students to become more autonomous learners. Nonetheless, AWE is not without its disadvantages. As Zhang notes, L2 students may have difficulty interpreting AWE feedback, and the feedback these automated systems provide may have detrimental effects on students' writing (i.e., writing

to achieve higher AWE-generated scores). Accordingly, teachers must consider the affordances and limitations of any AWE system before incorporating the technology into the L2 writing classroom.

Another popular AWE system that has been gaining attention in CALL literature is Grammarly. The developers of Grammarly state that the AWE tool uses AI to “augment your skills at every step, including landing your intended tone, refining complicated sentences, and turning rough ideas into polished communication with accurate spelling, punctuation, and grammar” (Grammarly, 2023, para. 1). In recent years, several studies have explored the effectiveness of Grammarly to improve L2 writing as well as students’ perceptions of the AWE tool. In a quasi-experimental study, Barrot (2021) investigated the impact of Grammarly on L2 English students’ writing accuracy. Results revealed that the experimental group which used the AWE tool was able to significantly improve the accuracy of their writing. Open-ended responses from the experimental group highlighted some of the perceived affordances of Grammarly, e.g., they were able to learn English grammar and they could take control of their own learning. Using a counter-balanced design, Dizon and Gayed (2021) studied the use of the Grammarly mobile keyboard among L2 English students at a Japanese university. Findings indicated that Grammarly had a significantly positive effect on two of the four variables studied (grammatical accuracy and lexical richness), with no statistical differences found between the Grammarly and non-Grammarly groups when it came to writing fluency and syntactic complexity. Thi and Nikolov (2021) also investigated the use of Grammarly, but rather than focusing exclusively on the writing aid’s potential to enhance L2 writing performance, the researchers examined how Grammarly could complement teacher feedback to support L2 English writing. Findings from the study showed that Grammarly and teacher feedback focused on different aspects of L2 writing, i.e., Grammarly targeted language-related errors while teacher feedback focused on both content and language issues. Results from a questionnaire indicated that participants had positive views toward both Grammarly and teacher feedback, demonstrating that Grammarly can be used in conjunction with teacher feedback to promote L2 writing development. In a recent study, Kawashima (2023) compared Japanese EFL students’ perceptions of Grammarly feedback with teacher feedback. Although the survey results indicated that the participants perceived the AWE tool to be effective in enhancing L2 writing, most of them preferred teacher feedback over Grammarly as feedback from the tool was thought of as less helpful and reliable. Other recent research on Grammarly by Guo et al. (2022) and Yousof (2022) reinforce the largely positive results found in the previously detailed studies in terms of the technology’s impact on L2 writing performance and students’ positive views toward its use.

Research questions

Although the literature review above underscores the significance of FLA and LA in the L2 classroom and highlights the largely positive L2 research results



concerning Grammarly, FLA and LA are both underexplored in AWE studies. Additionally, while some studies have investigated L2 students' views of Grammarly (Barrot, 2021; Kawashima, 2023; Thi & Nikolov, 2021; Yousof, 2022), more research is needed to better understand learners' perceptions of the AWE tool, particularly in the context of its influence on FLA and LA. For these reasons, the following research questions were addressed in this study:

1. Does Grammarly have a significant effect on EFL learners' FLA or LA?
2. What are the EFL learners' perceptions of Grammarly in the L2 writing classroom?

Methodology

Research design

This study employed a mixed methods research design to investigate the use of Grammarly in the L2 writing classroom. Quantitatively, a survey was administered at two points during the semester to measure the impact of Grammarly on the participants' FLA and LA. Qualitative data in the form of written reflections was also collected from the participants to gain deeper insight into their attitudes toward Grammarly as a L2 writing tool.

Participants

Convenience sampling was used to recruit participants in the study. Initially, 96 EFL students from two different faculties at a Japanese national university provided informed consent to participate in the study. They were enrolled in one of two academic writing-focused courses that met once a week for 90 minutes over the course of the 16-week fall semester of 2022. Students taking one of the academic writing classes were a part of the Language and Communication Faculty. They were all first-year, non-English majors who had to take one year of compulsory English classes and had opted to enroll in the faculty's advanced English courses in their second semester. The second academic writing class comprised students from the International Studies Faculty, who were all second- or third-year English majors taking the course as an elective. In total, four intact classes – two from each faculty – were used, all taught by one of the researchers. However, due to attendance issues and/or lack of completion of all the research instruments (pre-/post-surveys and reflective writing), only data from 58 students was ultimately included in the study's analysis. The participants ranged in age from 18 to 20 years old and included 22 males and 36 females. Although specific data related to language proficiency was not collected, the participants' English ability levels ranged from B1 to B2 on the Common European Framework of Reference for Languages (CEFR) scale.

Procedure

All participants within each academic writing class were required to use Grammarly as part of their weekly writing assignments. To facilitate this, during the second class of the semester, students watched a tutorial video created by the researcher-teacher introducing Grammarly—explaining what it was, how it worked, and how it could be a useful tool to help them independently improve their writing. The tutorial showed different step-by-step options for downloading and using Grammarly. Students were encouraged to use any of the following three methods: 1) the Grammarly website, 2) the Grammarly Chrome extension to use with Google Documents, or 3) the Microsoft Word Grammarly extension. Lastly, the researcher-teacher walked students through the sample text the Grammarly website provides for new users to illustrate a concrete example of how to utilize Grammarly to find and fix their writing errors. The tutorial video was also available on each class's Google Classroom page – which was the learning management system (LMS) used by the researcher-teacher, so that students could watch and refer to it on their own if they ever had uncertainties regarding Grammarly.

The academic writing course within both faculties comprised similar weekly writing tasks, namely, timed writings and various reading comprehension summaries and reflections. Across the semester, this amounted to approximately 20 writing tasks per class, each averaging around 2–3 paragraphs (200–300 words) in length. These tasks were all done on Google Documents with the assistance of Grammarly. The Google Documents were created and provided by the researcher-teacher and included a similar format regardless of the writing task (see Appendix A for examples). Figure 1 below depicts the two stages involved in each writing task. For part one, students were asked to complete the writing task themselves without Grammarly. This allowed students to ascertain their current ability on each week's assignment by comparing their pre-Grammarly version with their final post-Grammarly version of the assignment. For part two, the students were required to copy and paste their initial writing draft to the second section of the handout and use Grammarly to assist in the revision process. First, students were asked to review all the low-level errors (i.e., spelling, punctuation, grammar, etc.) Grammarly found in their writing and then identify their most commonly recurring ones. Next, students wrote a brief reflection on their errors and developed strategies to overcome them in future writing. Lastly, they went through their initial draft, using Grammarly's automated feedback to self-edit and revise their sentences. Including these two versions of their draft (i.e., pre-Grammarly and post-Grammarly) made up part of the assignment grade, thereby incentivizing the students to ensure they incorporated the AWE tool in their writing each week. Incorporating Grammarly in this way also reflected Little's (2007) three LA principles. That is, learners were actively *involved* in the revision process through the written tasks. They also had to *reflect* upon their written output and the Grammarly feedback to formulate strategies to improve their writing. Moreover, they used the *target language*, both to write and edit their written drafts and to reflect upon their learning.

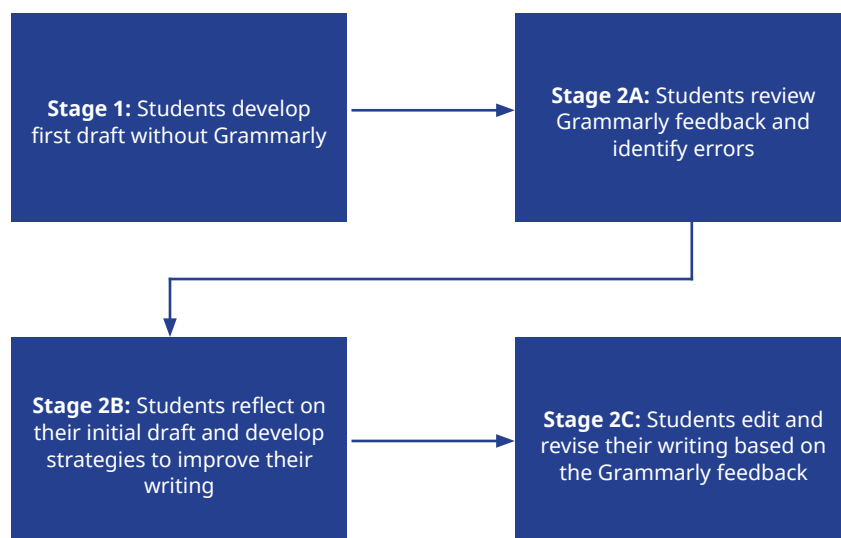


Figure 1. Writing process for each task

Research instruments

Two research instruments were developed to meet the aims of this study. The first research instrument was a survey consisting of 15 Likert scale items, which asked students to rate their level of agreement according to a five-point scale (1 = strongly disagree; 5 = strongly agree). The survey was made up of two constructs: FLA and LA (see Appendix B for these survey items). The seven FLA-related items were adapted from Horwitz et al.'s (1986) original FLCAS and a more recent version of the survey involving CALL (York et al., 2021). The remaining eight items were concerned with LA and were adapted from McCrocklin's (2016) research on ASR and LA. Both constructs had Cronbach's alpha values over 0.9 on the pre- and post-surveys, indicating a high level of internal reliability. The prompt for the reflective writing task was adapted from Lee's (2011) study on blogs and LA. It comprised four open-ended questions (see Appendix C) which asked the students to reflect upon their experiences using Grammarly throughout the semester.

Data collection and analysis

The survey was administered to the students at the beginning and end of the semester to assess the impact of Grammarly on the two variables studied. Qualtrics, an online survey platform, was used to administer the survey. In addition to the pre- and post-surveys, the students were assigned a final written reflective task. This written reflection was assigned during the penultimate class of the semester.

Excel was used to calculate means and standard deviations for the quantitative survey data. Dependent t-tests were conducted to assess whether there were significant differences in FLA and LA among the participants from the pre- to the post-test. Conventional content analysis was used to analyze the

qualitative data from the reflective reports (Hsieh & Shannon, 2018). To improve the reliability of the coding process, an approach outlined by Campbell et al. (2013) was followed. Specifically, the first author coded the data using content analysis. Independent from the first author, the second author then coded this marked data minus the first author's codes. Following this, both authors compared their analyses and resolved any differences in their coding.

Results

RQ1: Does Grammarly have a significant effect on EFL learners' FLA or LA?

Table 1 below shows the mean and standard deviation values of FLA and LA on the pre- and post-surveys. Results from the pre-survey suggest that the learners had mixed views concerning their perceived FLA and LA. That is, the pre-survey values for both affective variables were close to 3, indicating a neutral or "not sure" position. There was a slight decrease in FLA from the pre-survey to the post-survey; FLA was reduced by 0.52 or 16.6%. Similarly, there was a small change in LA from the pre- to the post-survey, with LA increasing from 2.94 to 3.24, a 10.2% increase. Results from a dependent t-test indicated that there was a significant difference in the level of FLA among the participants when comparing the pre- and post-survey results, $t(405) = 14.09$, $p < 0.0001$. In terms of LA, a significant difference was also found from the pre- to the post-survey, $t(463) = 12.04$, $p < 0.0001$.

Table 1. Pre- and post-survey results

Construct	Pre-survey		Post-survey	
	M	SD	M	SD
FLA	3.13	1.10	2.61	1.24
LA	2.94	1.32	3.24	1.34

RQ2: What are the EFL learners' perceptions of Grammarly in the L2 writing classroom?

Table 2 below displays the six positive themes that were identified from the content analysis of the written reflective report data. The most frequently commented-on theme was error correction, i.e., many of the participants believed that Grammarly was able to detect mistakes in their English writing and mark them for later self-revision. A majority of the learners (53%) also thought the AWE tool could help them improve their English writing skills. Thirdly, slightly less than half of the participants (43%) stated that Grammarly directed their attention to errors in their writing, which made them more aware of the mistakes they tended to make. About 40 percent of the respondents stated that they enjoyed using the AWE tool and approximately 30 percent perceived it

as easy to use. The last identified advantage was increased confidence, which was commented on by five of the participants.

Table 2. Positive themes related to the use of Grammarly

Theme	Number of survey respondents who commented (percentage)	Example quotations
Error correction	41 (70.6%)	Grammarly is good for reducing careless mistakes. I can fix small grammar and spelling mistakes.
English improvement	31 (53.4%)	Grammarly improved my English writing. I learned when to put the preposition, and the number of errors decreased. As I received fewer and fewer pointers from Grammarly, I realized that my writing skills were improving.
Metalinguistic awareness	25 (43.1%)	When Grammarly suggests my mistake, I try to think about, what is wrong, what is needed, and what is not needed. So I think many times about my mistake and fix that. Seeing the kind of errors you usually have in your writing helps you pay attention to the [sic] them from then on.
Enjoyment	24 (41.3%)	I enjoyed using Grammarly, mostly because the interface is user-friendly and it gets the job done. Overall it feels satisfying to use. Grammarly displays the overall score of the sentences. I was happy when the score reached 100.
Ease of use	19 (32.7%)	Grammarly can be used easily and automatically to search for mistakes. I can fix my essay easily only by pushing a keyboard.
Increased confidence	5 (8.6%)	Grammarly helped me correct the low level errors and submit my writing with confidence. Before using Grammarly, I was always worried about some spelling or grammar mistakes when submitting English papers, but now I am less worried.

While negative comments related to Grammarly were less frequent, six themes were identified from the analysis as disadvantages of the AWE tool (see Table 3). The two negative themes that appeared most often in the participants’ reflective writing related to feedback, namely, inaccurate feedback (25%) and vague feedback (18%). That is, some of the learners had concerns about Grammarly’s reliability to give accurate feedback, and a portion of them had difficulties with the AWE tool’s lack of clarity or specificity. Approximately 10 percent thought Grammarly did not lead to improvements in English writing. Three other negative themes were commented on by less than 10 percent of the participants: excessive feedback (8%), limitations of the free version (5%), and technical issues (5%).

Table 3. Negative themes related to the use of Grammarly

Theme	Number of survey respondents who commented (percentage)	Example quotations
Inaccurate feedback	15 (25.8%)	<p>The most difficult thing about Grammarly was that I needed to find out whether the suggestion from Grammarly was correct. Sometimes it suggested very clearly strange things, and I almost accepted it.</p> <p>Grammarly sometimes falsely flagged words that had no typos...I had to go out of my way and do some research to prove the software wrong a few times but I could always add those words to my personal dictionary and I would assume that Grammarly would not flag them again.</p>
Vague feedback	11 (18.9%)	<p>I sometime didn't understand why Grammarly changed the words or phrase because explanation was less for me.</p> <p>Grammarly revises my answer, but it does not explain why my sentences are wrong.</p>
Lack of improvement	6 (10.3%)	<p>Grammarly does not allow me to improve my English writing much. Grammarly fixes my mistakes but can rewrite English sentences easily, which is not good for me in terms of improving my English writing.</p> <p>I don't think Grammarly will lead to that much growth because it will only correct my mistakes and not give me knowledge. This is because a mistake can be corrected with the push of a single button, and it is difficult to have the awareness to think deeply about why the mistake was made.</p>
Excessive feedback	5 (8.6%)	<p>It was sometimes tiresome because I made many mistakes to fix.</p> <p>A lot of mistakes made me sad.</p>
Limitations of free version	3 (5.1%)	<p>I cannot receive few services for a free plan. I can find the mistakes with Grammarly which I can find out easily on my own, but some kinds of mistakes are not found with free Grammarly.</p> <p>The difficulty with Grammarly is that I have to pay for functions other than the spelling check.</p>
Technical issues	3 (5.1%)	<p>At first, I tried Grammarly with Chrome but it was uncomfortable for me.</p> <p>I cannot use Grammarly at Google Documents. I had to copy my writing and paste Word to use Grammarly.</p>

Discussion

Grammarly's effect on FLA and LA

The first research question addressed Grammarly’s potential impact on the students’ FLA and LA. Based on the results of the analyses, it was found that the AWE tool had a significant positive influence on both variables. These findings

align with previous CALL studies showing that technology can decrease FLA and support LA (e.g., Bashori et al., 2021; Lenkaitis, 2020; McCrocklin, 2016; Thrasher, 2022). The results also demonstrate that AWE is beneficial for L2 learners beyond improvements to L2 writing performance (Fu et al., 2022). Moreover, the findings bolster previous research involving Grammarly and L2 writing (e.g., Barrot, 2021; Thi & Nikolov, 2021). One plausible explanation for these positive results relates to AWE's effect on students' cognitive load. Namely, AWE software has the potential to reduce the cognitive load of L2 learners (Gayed et al., 2022), which can lead to decreased FLA and enhanced LA (Chen et al., 2022; Tonkin et al., 2019). Another possible reason for the positive findings in this study may be related to the specific features of Grammarly. That is, the AWE tool encourages L2 learners to reflect upon their English by making them review its feedback. In turn, LA is enhanced as the students take more control of the learning process, i.e., they do not need to rely on teacher feedback and can choose what AWE feedback to accept or reject. FLA is also decreased as the students are able to submit their assignments with fewer lower-level writing errors due to the Grammarly feedback. While these results concerning Grammarly's impact on FLA and LA are promising, it is important to note that a control group was not utilized in the study. Consequently, it is not clear if the AWE tool was the primary factor that led to these positive findings.

Student perceptions of Grammarly

Research question 2 focused on the participants' views of Grammarly for L2 development. According to the analysis, the EFL students had largely favorable perceptions of the AWE tool. Namely, the number of positive comments related to Grammarly was greater than those that were negative. In particular, many of the students expressed that the AWE tool helped them correct errors in their writing, improve their English, and become more aware of gaps in their linguistic ability. These findings complement the quantitative results and may help explain why Grammarly had a positive effect on the learners, specifically in terms of LA. In other words, the AWE tool encouraged them to correct their own mistakes and reflect on their individual weaknesses as L2 writers, thereby promoting autonomy in the language learning process. Nevertheless, a few downsides pertaining to Grammarly were identified, especially regarding deficiencies in its feedback, which mirrors the student concerns reported by Kawashima (2023). Also, some participants in the present study were skeptical of the AWE tool's impact on their language development. This suggests that there may be a gap between what the research says about Grammarly (i.e., the tool is effective in improving certain aspects of L2 writing) and some students' attitudes toward the AWE tool. Thus, when introducing the tool to students, it may be useful for teachers to inform them about the positive effects Grammarly can have on L2 writing while citing relevant literature. In turn, this may serve to increase learner confidence in the digital resource. The findings in this study concerning student perceptions of Grammarly are similar to the generally positive results found in previous research on the AWE tool (Barrot,

2021; Kawashima, 2023; Thi & Nikolov, 2021; Yousof, 2022). Taken together, it appears that EFL learners perceive Grammarly to be a useful tool for L2 writing development despite some of its limitations.

Conclusion

The aims of this study were twofold: to investigate if Grammarly had a significant impact on Japanese EFL learners' FLA and LA and to explore their views of Grammarly as a tool to support L2 writing. Pre- and post-surveys and reflective written reports were used to address the study's research questions. The results indicated that the AWE tool did have significant effects on the FLA and LA of the learners and that they had mostly positive attitudes toward its use in the L2 writing classroom. These findings are significant as they illustrate that the popular, free-to-use AWE tool can effectively reduce FLA and improve LA, two affective factors that have been underexplored in AWE research.

This study's findings have implications for using Grammarly in L2 writing classrooms. First, Grammarly could be used to lower the FLA among L2 learners. This is significant as moderate FLA is commonplace among L2 learners (Horwitz, 2016) and remains consistent regardless of proficiency level in the L2 (Zhang, 2019). In combination with Little's (2007) LA principles, Grammarly could also be incorporated into the classroom to promote autonomy. As shown in this study, the AWE tool gives EFL learners the capacity to self-edit their writing without the assistance of a teacher. One other important implication that can be gleaned from this study is the significance of effectively interpreting Grammarly's feedback. Several participants stated that the tool's feedback was either inaccurate, too vague, or excessive. Therefore, it is important for language teachers to provide effective training so that students can best leverage Grammarly's feedback. In addition to covering the basic features of Grammarly, this training could involve informing students of the affordances and limitations of the writing assistant, as well as encouraging them to reflect when revising with Grammarly to better promote metalinguistic awareness. Another important consideration is the length of support provided to students. Although training was provided at the onset of this study, continued guidance on Grammarly could have alleviated some of the issues reported by the students.

As with most classroom-based research, this study suffers from some limitations. For instance, data was collected from a single public university in Japan. As a result, it would be worthwhile to conduct research across different educational levels, particularly since all the Grammarly studies detailed in this paper, including the present one, were conducted with college-aged participants. Moreover, the students in this study utilized the free version of Grammarly, which gives lower-level feedback only. Accordingly, a few participants in the current study expressed frustration with the AWE tool's limited features. Therefore, it would be interesting to see if the paid version of Grammarly better supports positive changes to FLA, LA, and/or writing performance compared to the free version. Furthermore, convenience sampling was used, so it would be prudent to conduct a future study with a randomized

sample to reduce the risk of bias affecting the results. Lastly, the absence of a control group in the study makes it difficult to solely attribute the positive findings to the influence of Grammarly; thus, future studies involving the digital tool should incorporate a control group to reduce the impact of confounding variables.

Declarations

The researchers have no conflicting interests to declare.

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Source Summary #1

Source Title:

1.) Your Summary (without Grammarly):

2.) Next, copy/paste your original writing from above here. Then turn on and use Grammarly to revise your responses (fix any errors)

Before you self-correct your responses using Grammarly, look through the types of errors it has identified you made and identify the one that occurred the most.

- Write that below, and one sentence on how you plan to improve it for next time

Copy of #1 from above + Grammarly revisions:

Grammarly Reflection

1.) My most common type(s) of error in this assignment:

2.) I will improve this for next time by:

Figure 2. Weekly writing assignment template: Source summary 1

Title of Your Essay

1.) Your Introduction Paragraph(s) (without Grammarly):

2.) Next, copy/paste your original writing from above here. Then turn on and use Grammarly to revise your responses (fix any errors)

- Before you self-correct your responses using Grammarly, look through the types of errors it has identified you made and identify the one that occurred the most.
- Write that below, and one sentence on how you plan to improve it for next time

Copy of #1 from above + Grammarly revisions:

Grammarly Reflection:

1.) My most common type(s) of error in this assignment:
(ex. incorrect use of prepositions, articles, verb form, punctuation, etc.)

2.) I will improve this for next time by:

Figure 3. Weekly writing assignment template: academic essay introduction paragraph

Appendix B

Adapted survey items concerning foreign language anxiety and learner autonomy

(Horwitz et al., 1986; McCrocklin, 2016; York et al., 2021)

FLA1: I never feel quite sure of myself when I am writing in my English language class.

FLA2: I don't worry about making mistakes in language class.

FLA3: I start to panic when I must write without preparation in language class.

FLA4: In language class, I can get so nervous I forget things I know.

FLA5: Even if I am well prepared for language class, I feel anxious about it.

FLA6: I feel confident when I write in language class.

FLA7: I am afraid that the other students will laugh at me when I write the English language.

LA1: I care about my writing in English.

LA2: I want to continue improving my English writing.

LA3: I am capable of successfully practicing my English writing on my own.

LA4: I have the resources and tools that can help me work on my English writing.

LA5: I can use technology to help me with my English writing.

LA6: I need a native speaker to know how to write English correctly.

LA7: I need a native speaker to correct my English writing to improve.

LA8: I need a teacher to help me improve my English writing.

Appendix C

Reflective writing questions adapted from Lee (2011)

1. How did you use Grammarly? Was the use of Grammarly a worthwhile experience? Why or why not?
2. In your view, did Grammarly allow you to improve your English writing? Why or why not? Use examples to justify your answers.
3. Did you enjoy using Grammarly? Did you find the Grammarly feedback useful? If so, in what ways?
4. What did you gain from using Grammarly? How satisfied were you with Grammarly? Did you experience any difficulties? Write any additional comments.