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Improving Academic Writing CAF through e-Portfolios: The Case of EFL Students at Batna 2 University

تحسين الكتابة الأكاديمية (التعقيد المعجمي، الدقة، والطلاقة) باستخدام الحقيبة الإلكترونية: دراسة حالة لمتعلمي اللغة الإنجليزية للناطقين بغيرها في جامعة باتنة 2

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Abstract:

Educational technology created numerous assessment tools to assist both teachers and learners in improving learning outcomes. One of the tools that gained attention is the electronic portfolio (e-portfolio) which is exclusively used for pre-service teachers. However, the present study investigates using e-portfolios to improve students' academic writing; namely, lexical complexity, accuracy, and fluency (CAF). The study featured 60 EFL students at Batna 2 University who were equally divided into an experimental group and a control group, following three phases that lasted a semester: pre-test, treatment, and delayed post-test. During the three phases, students produced essays that were thematically categorized and course-related, producing total of 420 essays which were collected and analyzed using a reliable rubric. Results showed that e-portfolios explicitly affect and enhance writing CAF, yet they were inconclusive regarding the long-term effect. Pedagogical implications of implementing e-portfolios in EFL educational settings and recommendations for further investigation are discussed.

Keywords: Accuracy; Complexity; Fluency; e-Portfolios.

ملخص باللغة العربية

أحدثت رقمنة بيداغوجيا التعليم العديد من أدوات التقييم لتحسين العملية التعليمية. من بينها المحفظة الإلكترونية، والتي تُستخدم في نظام التعليم الجزائري حصريًا في تكوين الأساتذة حديثي التوظيف. لذلك، تبحث الدراسة الحالية تأثير المحفظة الإلكترونية على تحسين الكتابة لدى متعلمي اللغة الإنجليزية كلغة أجنبية، واشتملت على 60 طالبًا من في جامعة باتنة 2 تم تقسيمهم إلى مجموعتين: تجريبية وضابطة واتباع ثلاثة مراحل كتابية: أولي، علاجي، وطويل المدى. ليتم جمع 420 مقالا وتحليله باستخدام الصيغ الرياضية، كانت النتائج إيجابية فيما يخص تأثر وتحسين الكتابة، لكن غير حاسمة حول التأثير طويل المدى. أخيرا، تمت مناقشة تدريس الكتابة باللغة الإنجليزية كلغة أجنبية وتقديم توصيات.

كلمات مفتاحية: الدقة؛ التعقيد المعجمي؛ طلاقة؛ المحفظة الإلكترونية.

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1- Introduction

The field of teaching English as a second language (ESL) and as a foreign language (EFL) has undergone major tidings to create sustainable learning outcomes. Related, building repertoire of students' skills is indispensable in designing oral and written learning tasks and assessing the learning product. Yet, assessment differs accordingly in terms of speaking versus writing performances; the latter is a complex activity of translating thoughts into a coherent and logical arrangement of words using linguistic and cognitive competences (Kellogg, 2008).

Academic writing follows a formal and technical outline that affects its performance. In fact, complexity, accuracy, and fluency, henceforth referred to as CAF, are the three essential dimensions for writing performance and development (Housen, 2021, p. 9). The relationship held between the three elements is described as 'interactive' because they correspond with proficiency and provide effective reflections on certain language practicalities (Housen & Kuiken, 2009, p. 6). However, it must be noted that these elements may develop differently in terms of acquisition i.e. mastery level pace due to differences in linguistic and cognitive processes of language learning and development. (Skehan & Foster, 2012, p. 203)

Prior to foregrounding CAF as one unit variable in the general scheme of ESL/EFL research, these elements were considered independent constructs in language written production in terms of development and assessment. In fact, while complexity and fluency are classically defined by their level of sophisticated production, accuracy is defined by learner's ability to filter any errors from language production. The reason why understanding the nature of CAF is rather hindered when attempting to have a clear-cut definition of each (Housen & Kuiken, 2009, p. 6). Following, Skehan (1998; 2009) proposed integrating complexity, accuracy, and fluency as proficiency model for the first time before he reviewed the methodological measures and correlations between these components on the basis of critical views of task-based research.

Indeed, CAF in its written and oral forms is affected by many factors; namely, task complexity, task familiarity, task repetition, task planning, syntactic and morphological structures, and even learners' linguistic and psycholinguistic mechanisms. In return, the three elements are acknowledged to have impacts on L2 as they manifest themselves in the three stages of language learning, and they correspond with language proficiency. (Houssen et al., 2012, p. 3)

To illustrate, Abdollahzadeh and Kashani (2011) examined the effect of task complexity on the EFL learners through using complexity, accuracy, and fluency as measures; he elicited that the two first elements showed correlations with language proficiency, opposed to fluency. On a different pattern, Kuiken et al. (2005) found that Dutch learners of Italian language showed no correlation between task complexity, lexical and syntactic complexity, and fluency, but great correlation

between task complexity and accuracy. These results were subject to competence of learners because both studies featured samples with a disparity in language levels and language competence is identified through language performance.

Narrowing down, portfolio is considered as a writing tool which allows learners to monitor what they are learning; Aghazadeh and Soleimani (2020) reported learners' positive attitude towards using e-portfolios in writing tasks, in addition they reported positive correlation with e-portfolios and writing CAF. Likewise, Alhawamdeh et al. (2023) suggested using e-portfolios as an assessment tool because it generated higher levels of the triad and helped learners to be more efficient, autonomous, and it reduced their anxiety. Similar views were reported by Aydin (2014) who asserted the role of e-portfolios in pre-writing activities. Generally, innovative technological tools as e-portfolios cannot be dismissed and in spite of limited literature on the subject matter with regard to writing CAF assessment. Such research gap motivated the present study that seeks to identify if there's an outcome of e-portfolios in academic writing and to locate precisely their effect on complexity, accuracy, and fluency in the Algerian higher education context on the short and the long term. To meet these objectives, the following research questions are proposed:

1. Do e-portfolios affect learners' academic writing CAF?
2. Do e-portfolios enhance learners' academic writing CAF?
3. Do e-portfolios affect learners' academic writing CAF on the long term?

And the following hypotheses are proposed:

1. E-portfolios affect learners' academic writing CAF,
2. E-portfolios enhance learners' academic writing CAF,
3. E-portfolios affect learners' academic writing CAF on the long term.

2- Methods

The study featured an experimental design and delivered qualitative and quantitative data. To attain the objectives per-mentioned, the study followed convenient sampling technique due to the relative longevity of the treatment and the unavailability of other students and teachers to implement it. The sample of post-graduate students was also selected on the basis of familiarity with Academic Writing course, opposed to undergraduate students, in addition to their accessibility. Thus, it featured the total of 60 EFL Master students who were enrolled in Sociolinguistics course during the second semester of the academic year 2022-2023.

Moreover, the sample size made (80%) out of the population of 75 students, the 20% of students were excluded due to their absences or dropping out, therefore unfulfilling the experiment requirements. In terms of age, it ranged between 21 and 31 years old with the mean of 22.4 years, which was calculated following a consented administrative access to database (Progres) at the

Department of English Language and Literature, Batna 2 University. As for gender, the sample featured 12 males and 48 females. Also, the sample was equally divided into experimental group and control group (30 students in each group).

Next, the study featured a pre-test, a treatment, and a delayed post-test that are qualitative in nature; the essays produced by students were entirely course-related. Also, the pre-test and post-test followed a classroom setting at Batna 2 University opposed to online setting where the treatment was implemented using the ministerial approved platform Moodle. Quantitatively, the students' output ranged between 370 words to 500 words, producing the total number of 420 essays. Additionally, the study measured writing complexity, accuracy, and fluency through using formulas reported in related literature (Skehan 1998; 2009; Houssen 2021) and a designed rubric by Polio (1997).

Following, the procedure of the experiment lasted for one semester of 15 weeks, following three phases. Firstly, the experimental group and the control group received formative test in classroom after 4 weeks of studying in class, as to assess their writing abilities as well as to test their knowledge on the subject matter (Sociolinguistics Course); this served as a placement test before the treatment. The placement test dictated producing a coherent essay which is course-related.

Secondly, experimental group received a treatment which consisted of submitting essays online each week in the span of 10 successive weeks during the second semester of the academic year (2022-2023). The writing prompts were enlisted as 'Question of the Week' and were thematically categorized according to the content delivered in class. Also, they varied in form and were adapted from their coursebook. The experimental group did not receive any weekly feedback in order to prevent the overlapping of independent variables, and the control group received no treatment (i.e. implementing e-portfolios for 10 weeks) or feedback.

Lastly, we implemented a delayed post-test where both groups (experiment and control) received another writing test in class to indicate if e-portfolios had any long-term influence on their writing productions. The time allocated for all phases (pre-test, the treatment, and delayed post-test) was one hour as to focus on the effect of one variable and to generate reliable data. Also, the word count for essays was between 370 and 500 words as a minimum and maximum count, respectively. Following, the essays were assessed with respect to complexity, accuracy, and fluency using the formulas above-mentioned.

3- **Results and Discussion**

Table 1 displays results of the pre-test, specifically the scores of writing CAF, from which we find that the control group achieved higher levels of writing CAF than the experimental group, this is attributed to student's independent level of writing skill. Indeed, proficiency level is indexed by the

triad which in return is influenced by L1 (cf. Phuoc & Barrot 2022). On one hand, accuracy scored the highest among the three CAF pillars for both groups due to explicit instructions i.e. task instruction and sequencing received throughout the pre-test. In fact, the ability to produce well informative and factual text can be supported by knowledge previously formed and didactic guidance since being accurate, by definition, is being precise.

On the other hand, fluency scored the lowest index for both groups, producing a detailed layout of the precise writing hindrance faced by students during their academic writing performance: lack of vocabulary, avoiding repetition, and effectively structuring sentences are common challenges for EFL students sampled for this research. Overall, in spite of the minimal differences in the general CAF scores (differential value is scored 0.003), both groups fall into the same thematic spectrum of low fluency and higher complexity and accuracy. This can also be tracked to different proficiency levels found between ESL and EFL students marked in literature.

Table 1. Results of Writing CAF during Pre-test

Overall Performance	Complexity	Accuracy	Fluency
Experimental Group	0.015	0.017	0.02
Control Group	0.018	0.019	0.05

Next, Table 2 displays the results of using e-portfolios with the experimental group during the treatment phase. Significantly, the treatment showed progress in complexity, accuracy, and fluency of students which answers the first research question and supports the hypothesis that e-portfolios affect students' writing CAF. Comparing results of the experimental group in Table 1 and the overall results of Table 2, we find that complexity was the most affected criteria where the differential value is indexed 0.115, followed by accuracy (=0.073), then fluency (=0.02). The latter, on a similar pattern of pre-test, scored the lowest value. This is due to topic familiarity and the of effect of task complexity on lexical complexity, noting as well that overall language proficiency is complex and dynamic.

These results elaborate on the first hypothesis that e-portfolios affect substantially lexical complexity, noting that during the period of the treatment, it scored the highest value during 7 out of 10 weeks, opposed to fluency which scored the highest with a minimal extent of difference in comparison with lexical complexity and accuracy. Additionally, writing proficiency is dichotomous as a process and a product, and as the relation between the triad is salient, e-portfolio as a process boosts language proficiency as a product.

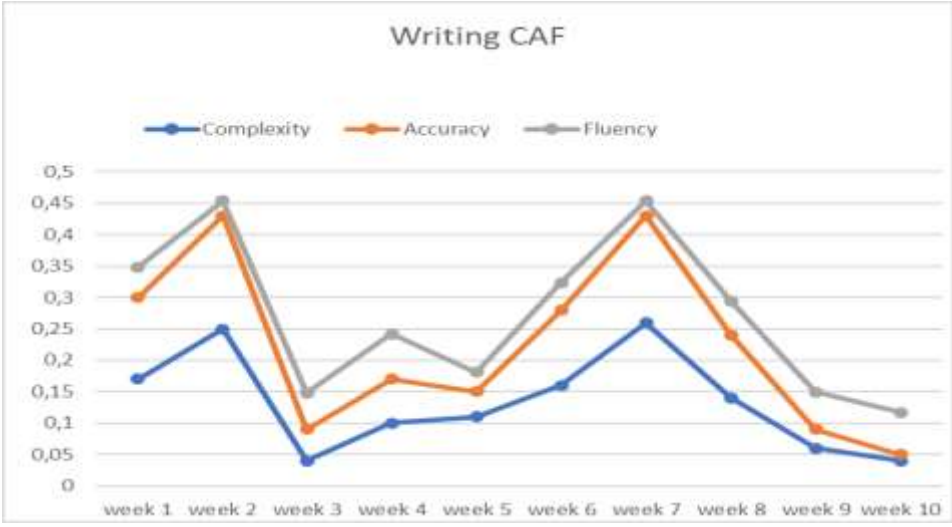
Table 2. Results of Writing CAF during the Treatment

Time Span	Complexity	Accuracy	Fluency
Week 01	0.170	0.130	0.048

Week 02	0.250	0.180	0.024
Week 03	0.040	0.050	0.058
Week 04	0.100	0.070	0.072
Week 05	0.110	0.040	0.031
Week 06	0.100	0.120	0.044
Week 07	0.260	0.170	0.024
Week 08	0.140	0.100	0.054
Week 09	0.060	0.030	0.059
Week 10	0.040	0.010	0.067
Total Average	0.130	0.090	0.040

Related, there's no pattern indexed in e-portfolios phase, meaning that there's no gradual progress/regress in students' CAF as displayed in Fig. 1, and the three pillars show high or low scores at any given point of the treatment, being relatively congruent in the structure of the text. We attribute this to two factors. Firstly, e-portfolios are dynamic in nature as they display different language products and assist learners with tracking learning processes, and that supports the second hypothesis that e-portfolios enhances learners' academic writing CAF. Secondly, the interaction of the triad is rather fluid and dependent on different language systems: internalization encompassing complexity, modification encompassing accuracy, and consolidation and proceduralization encompassing fluency (cf. Houssen et al., 2012, p.3), but identification of the relation between elements if it is causal, linear, reciprocal, or filtering falls short of confirmation.

Fig 1. patterns of writing CAF through e-portfolios



Following, the delayed post-treatment answers minimally the third research question because it does not provide a conclusive result that e-portfolios enhance students' writing CAF on the long term, but it asserts only the validity of the second hypothesis. Table 3 shows results of the delayed post-treatment where experimental group outperformed the control group, creating higher differential values than they have in the pre-test: 0.05 for complexity, 0.011 for accuracy, 0.04 for fluency. This is again supported by differences between language input and output when accounting for the three measures, more importantly it is that their interaction is not unified, nor it follows any linear production or evolution. (Ellis, 1994, p. 109 as cited in Houssen et al., 2012, p. 7)

Additionally, fluency level scored the highest level for both groups. Yet, complexity and accuracy respectively scored the lowest for the experimental group and the control group. This means that though control group scored higher values for fluency during the pre-test, e-portfolios ameliorated the experimental group's writing skill that assisted in targeting their fluency impediment and minimizing the differential values between the groups during the two stages. Results indexed in the two first stages and the performance of each element of the triad are explained by the effect of the Trade-off theory, which is learner's high performance in one element or two on the expense of the other elements (cf. Vercellotti, 2017, p. 90). In fact, there is no definite outline on how trade off effects operate in any task, which proposes a limitation on answering the 'why' and 'how' questions regarding filtering elements over others.

Comparing the pre-test and the delayed post-test results in Table 1 and Table 3, the experimental group has scored higher differential values in writing CAF indexed as 0.01 for complexity and accuracy and 0.08 for fluency, than the control group which respectively scored 0.002, -0.003, and 0.010 for complexity, accuracy, and fluency. Receiving no treatment, results of the control group also affirm the effect of e-portfolios on writing CAF in spite of their minimal long-term effect, where we argue that the sustained changeability of CAF and e-portfolios in addition to their intersection with language process and product stimulate their reciprocal effect, which in return, activates the trade-off effect that hinders long term improvements.

Table 3. Results of Writing CAF during Delayed Post-Test

Overall Performance	Complexity	Accuracy	Fluency
Experimental Group	0.025	0.027	0.100
Control Group	0.020	0.016	0.060

Comparing CAF results in the three phases for the experimental group, there was no linear pattern between pre-test, treatment, and delayed post-test, rather e-portfolios yielded higher differential scores in comparison with the pre-test than with the delayed post-test for complexity and

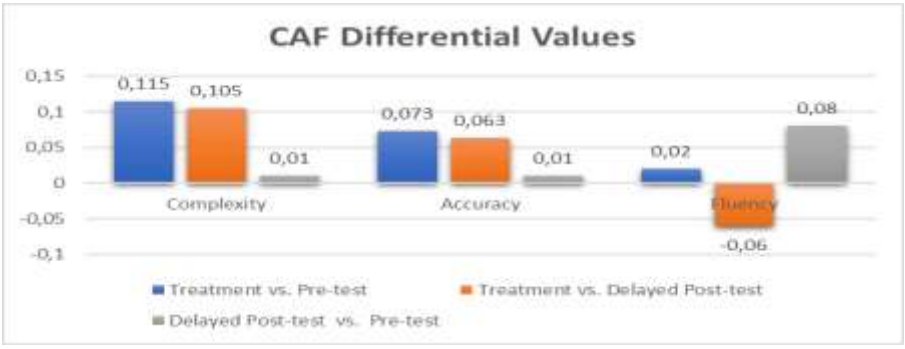
accuracy, opposed to fluency where students showed higher fluency level in the delayed post-test assessment as displayed in Fig. 2.

To explain these differences, we must refer back to the Trade-off hypothesis; such disparity is ascribed to task conditions, cognitive abilities, and time which can support progress of the triad while other conditions and abilities can hinder the developmental process. Indeed, the interaction between the three elements is rule-free and differs according to proficiency levels and individual differences: learners can be fluent but moderately accurate, or may produce complex syntax on the expense of fluency, so learners apply filtering action or the trade-off effect to fulfill learning tasks.

Given such lack of clear-cut definition between the triad, complexity, accuracy, and fluency can only be compared to one another between stages (Fig. 02) due to their indicative nature which assign them as methodological measures for the overall proficiency level of the language. "if we examine the dimensions one by one, we miss their interaction, and the fact that the way that they interact changes with time as well" (Larsen-Freeman 2009, p. 582 as cited in Houssen et al., 2012, p. 7). Hence, the elements hold explanations for the longitudinal effect and disparity in their behavior during the three stages stem from their typology. To explain further, complexity is often synonymous with advancement, accuracy with exactness, and fluency with rate; which creates a binary categorization of language knowledge and language control (cf. Housten & Kuiken, 2009, p. 3).

By the same token, each of the elements is multi-defined due to its complex and interlinked layers that work differently and simultaneously in language acquisition and language learning context. Complexity is identified through task-complexity, and proficiency which has linguistic level and cognitive level; while the former is language-oriented in terms of structure and system, the latter encompasses learners' psycholinguistic features. Accuracy is the salience of learners with the linguistic knowledge. And fluency has a fluidity level, quantitative level, and error level. All in all, CAF is not only multi-faceted, rather sub-faceted as well and that supports again the effect of e-portfolios on a particular language proficiency measure, and their minimal effect over time, which propose further question regarding the creation of complex e-portfolios that correspond with writing CAF.

Fig.2 CAF results across the three stages



4- Conclusion

The study sought to identify the effect of using e-portfolios in enhancing writing skill for Algerian EFL students in higher education. To answer the general question, the study firstly identified three main features of writing to consider as measures of language proficiency which are lexical complexity, accuracy, and fluency (CAF), the validity of the framework was held positive in related literature.

Additionally, three main objectives were designed in the study using three main stages. Results of the pre-test were carried out as placement test between the control group who exhibited higher CAF levels than the experimental group. However, during the treatment, CAF levels of the experimental group significantly improved, which confirmed the first two hypotheses that e-portfolios not only impacted CAF scores, but also it improved their writing production. This adheres to the claim that implementing e-portfolios can actively engage students in their learning process, and raise their autonomy. It also helps teachers with locating students' impediments and see the overall progress.

In the delayed post-test, the experimental group exhibited significant CAF scores which were compatible again with the first two hypotheses, when comparing the pre-test and the delayed post-test. However, when comparing the treatment and delayed post-test, the third hypothesis that supported the longitudinal effect of e-portfolios on writing CAF was limited, given that fluency was highly salient compared to the hindered results of complexity and accuracy. The discrepant level of congruence was discussed in terms of the linguistic, (meta)cognitive characteristics of language (e.g. trade-off effects) and task, added to the psycholinguistic characteristics of the learner.

Mainly, the results support that e-portfolios may assist EFL learners only to a limited extent, yet its continuous use can assist with building learning milestones as e-portfolios capture particular aspects of language at particular times, given that technology is in constant updates for effective assessment tools. Indeed, technology outgrew the traditional sense of assessor, task, learner; therefore, learners can be engaged effectively to design assessment tasks which encourage them to properly direct their language skills and to build their soft skills.

Overall, the study cannot be generalized to a large extent due to certain limitations which are: duration when data were conceived compared to other studies; sample size and gender which affected the data obtained; and only specific levels of CAF were concerned for the study. For further studies, researchers are highly encouraged to conduct their investigations in longer time spans to study the longitudinal effect properly, to feature larger sample size, to investigate more levels of CAF in relation to other variables alongside e-portfolios, and to pilot innovative measures to identify the type of relation between the triad. Finally, educators and practitioners are advised to pilot using e-portfolios for elementary, middle, and high school pupils.

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6- The bibliography

Aydın, S. (2014). EFL writers' attitudes and perceptions toward F-Portfolio use. TechTrends, 58 (2), 59-77. https://doi.org/10.1007/s11528-014-0737-6

Aghazadeh, Z., & Soleimani, M. (2020). The effect of e-portfolio on EFL learners' writing accuracy, fluency, and complexity. The Reading Matrix: An International Online Journal, 20 (2), 182-199. http://www.readingmatrix.com

Al-Hawamdeh, B. O. S., Hussen, N., & Abdelrasheed, N. S. G. (2023). Portfolio vs. summative assessment: impacts on EFL learners' writing complexity, accuracy, and fluency (CAF); self-efficacy; learning anxiety; and autonomy. Language Testing in Asia, 13 (1), 1-29. https://doi.org/10.1186/s40468-023-00225-5

Ellis, R. (1994). A theory of instructed second language acquisition. Implicit and explicit learning of languages, 726.

Housen, A., & Kuiken, F. (2009). Complexity, accuracy, and fluency in second language acquisition. *Applied Linguistics*, 30 (4), 461–473. https://doi.org/10.1093/applin/amp048

Housen, A., Kuiken, F., & Vedder, I. (2012). Complexity, accuracy and fluency. Language Learning and Language Teaching, 1–20. https://doi.org/10.1075/lllt.32.01hou

Housen, A. (2021). Complexity, Accuracy and Fluency (CAF). Springer Texts in Education, 7 (1) ,87–792. https://doi.org/10.1007/978-3-030-79143-8_136

Kellogg, R. T. (2008). Training writing skills: A cognitive developmental perspective. Journal of Writing Research, 1 (1), 1–26. https://doi.org/10.17239/jowr-2008.01.01.1

Kuiken, F., Mos, M., & Vedder, I. (2005). Cognitive task complexity and second language writing performance. EUROSLA Yearbook, 5 (5), 195–222. Portico. https://doi.org/10.1075/eurosla.5.10kui

Kuiken, F., & Vedder, I. (2011). Chapter 4. Task complexity and linguistic performance in L2 writing and speaking. Task-Based Language Teaching, 91–104. https://doi.org/10.1075/tblt.2.09ch4

Larsen-Freeman, D. (2009). Adjusting Expectations: The Study of Complexity, Accuracy, and Fluency in Second Language Acquisition. Applied Linguistics, 30(4), 579–589. https://doi.org/10.1093/applin/amp043

Phuoc, V. D., & Barrot, J. S. (2022). Complexity, accuracy, and fluency in L2 writing across proficiency levels: A matter of L1 background? Assessing Writing, 54, 100673. https://doi.org/10.1016/j.asw.2022.100673

Polio, C. G. (1997). Measures of Linguistic Accuracy in Second Language Writing Research. Language Learning, 47(1), 101–143. https://doi.org/10.1111/0023-8333.31997003

Skehan, P. (2009). Modelling second language performance: integrating complexity, accuracy, fluency, and lexis. Applied Linguistics, 30 (4), 510–532. https://doi.org/10.1093/applin/amp047

Skehan, P., & Foster, P. (2012). Complexity, accuracy, fluency and lexis in task-based performance. *Language Learning &* Language Teaching, 199–220. https://doi.org/10.1075/lllt.32.09fos

Vercellotti, M. L. (2017). The development of complexity, accuracy, and fluency in second language performance: A longitudinal study. Applied linguistics, 38 (1), 90-111. https://doi.org/10.1093/applin/amv002