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Investigating Writing Development Through Advanced Syntactic Analysis Tools Among English Majors At Thai Nguyen University Of Education

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Abstract
This study examines the writing proficiency development of English major students at Thai Nguyen University of Education over a three-month period. Employing TAASSC and TAALES, it evaluates complexity, accuracy, and fluency (CAF) dimensions in students' essays. The findings reveal a significant increase in holistic scores, highlighting the role of lexical sophistication in overall language refinement. The study advocates for a balanced teaching approach that integrates vocabulary enrichment with targeted interventions for accuracy and fluency. Furthermore, it underscores the significance of technology in enhancing educational research methodologies.
Index terms - *Writing proficiency, CAF, lexical sophistication, grammatical accuracy, language education.*

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I. Introduction

The significance of learning to write in English as a second language (L2) is immense in today's globalized world. English is widely used in industries like commerce, research, and trade (Canagarajah, 2007), making it essential for learners worldwide (Harman et al., 2007). Writing well in English is crucial for academic success, both in Vietnam and globally (Bolton, 2008; Duong and Chua, 2016).

Written tests often assess L2 ability in academic settings. Scholars emphasize the importance of personalized instruction, practice, and feedback for developing advanced writing skills (Hyland, 2002a; Ferris, 2005). These tasks are time-consuming but necessary for producing well-crafted written documents.

Linguistic development, particularly syntactic complexity, is a key focus in L2 writing research (Ortega, 2012). Studies show a strong link between syntactic complexity and overall L2 development and proficiency. Most research on L2 writing focuses on tertiary ESL contexts (Shaw & Liu, 1998; Storch, 2011). For instance, Shaw and Liu (1998) studied the writing improvement of international students in the UK, noting a shift from oral to written register over time.

Previous studies provide critical insights for this research. For example, Benevento and Storch (2011) examined writing development in French secondary school students, observing improvements in discourse level and linguistic complexity but not in accuracy.

Despite extensive research, there is a lack of studies on Vietnamese students' writing development. This gap limits understanding and effective instructional practices for Vietnamese students. Therefore, this study focuses on the linguistic complexity in Vietnamese university students' essays, building on prior research like Benevento and Storch (2011).

The study also considers the complexity, accuracy, and fluency (CAF) constructs, reflecting the multifaceted nature of L2 development (Verspoor, Lowie, Chan, & Vahtrick, 2017). The research targets Vietnamese students (n=50) at Thai Nguyen University of Education, using automatic text analysis to compare writing proficiency in essays written three months apart.

Research questions:
1. Does writing proficiency in terms of CAF among English major students at Thai Nguyen University of Education develop over a three-month period?
2. Which specific aspects of CAF exhibit development within this period?

II. Literature Review

An overview of writing development

The exploration of writing development has significantly shaped our understanding and evaluation framework. Wolfe-Quintero, Inagaki, and Kim's 1998 monograph introduced metrics to evaluate writing skill progression, which remains valuable despite newer studies on language evolution (Bulte & Housen, 2012;

Verspoor et al., 2012). This study examines fluency, accuracy, and complexity in L2 writing. Wolfe-Quintero et al. (1998) defined language development as 'attributes of a learner's output that mirror a certain point or phase along a developmental trajectory', distinguishing advancement from the broader category of proficiency.

A recent anthology by Manchon (2012) redefined writing development beyond language growth, including genre mastery (Tardy, 2012) and objective establishment (Cumming, 2012). It encompasses diverse writing process facets, such as how authors adapt their approaches over time. Manchon's anthology presents writing development as an evolving change over time in various aspects of writing.

This investigation adopts Polio's (2017) definition of writing development: "an evolution over time in language (e.g., intricacy, precision, fluency, coherence, mechanics), genre expertise, text production procedures, metacognitive understanding and strategy application, and writing objectives and motivation." This comprehensive definition guides the current study's focus on specific facets of writing skill transformation, which will be detailed throughout the paper.

Measuring second language development

Prior research shows that L2 writing development and performance are multifaceted, making measurement challenging (Norris & Ortega, 2009a). However, the constructs of complexity, accuracy, and fluency (CAF) are recognized as effective measures for these dimensions (Wolfe-Quintero et al., 1998; Housen, Kuiken, & Vedder, 2012). The CAF triad is widely acknowledged as an effective indicator of progress in L2 learning and writing development, supported by recent research (Verspoor et al., 2017; Penris & Verspoor, 2017).

Despite its wide use, there is no universally accepted definition of the CAF constructs due to their complex nature. Wolfe-Quintero et al. (1998) provided a comprehensive description of each construct, aiding in their operationalization. Writing fluency, for instance, has been described in various ways, leading to potential confusion. This study measures writing fluency by paragraph length, while other research has used sentence length or composing rate.

Complexity is measured by the widely used syntactic complexity metric, clauses per T-unit (Norris & Ortega, 2009), which gauges subordination and is recommended for intermediate learners (Wolfe-Quintero et al., 1998; Ortega, 2009). This measure has strong empirical support for its association with L2 development and competency (Ortega, 2009).

Accuracy is measured by errors per unit, the most frequently used method (Ellis, 2009). Wolfe-Quintero et al. (1998) noted its effectiveness but also pointed out challenges, particularly for beginners and intermediate learners, as errors could indicate positive development. However, since the study's participants are university students with assessed academic abilities, this issue is less problematic. To enhance reliability, the study also uses IELTS marking criteria, including task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy, as the essays were written in an IELTS format. To have an overview understanding of the IELTS marking criteria, the table below demonstrates the four mentioned IELTS writing key assessment criteria.

Table 1: IELTS Writing Key Assessment Criteria

Criteria	Definition
Coherence and cohesion	This criterion is concerned with the overall organization and logical development of the message: how the response organizes and links information, ideas, and language.
Lexical resource	This criterion refers to the range of vocabulary the candidate has used and the accuracy and appropriacy of that use in terms of the specific task.
Grammatical range and accuracy	This criterion refers to the range and accurate use of the candidate's grammatical resource via the candidate's writing at sentence level.
Task response	For this criterion, candidates are required to formulate and develop A position in relation to A given prompt in the form of A question or statement, using A minimum of 250 words. Ideas should be supported by evidence, and examples may be drawn from A candidate's own experience.

Source: https://www.ielts.org/-/media/pdfs/ielts-writing-key-assessment-criteria.ashx

In short, by combining these language constructs of complexity, accuracy, and fluency, the results could provide a multidimensional view of learner growth. These results work as one of the quantitative descriptions of learner performance; acting as markers of competence levels and learner's general writing ability (Vyatkina, 2012).

Syntactic Analysis Tools in Writing Assessment

The current research used TAASSC (Tool for the Automatic Analysis of Syntactic Sophistication and Complexity) and TAALES (Tool for the Automatic Analysis of Lexical Sophistication) to analyze the developments in CAF (complexity, accuracy, and fluency) of the written essays.

TAASSC evaluates various aspects of how students express their ideas in writing, using four groups of measures. The first group employs SCA indexes with the Stanford Parser (Klein & Manning, 2003) and Tregex

(Levy & Andrew, 2006) to identify sentence structure patterns. The other three groups use the Stanford Neural Network Dependency Parser (Chen & Manning, 2014) and a Python XML parser to measure clause difficulties, phrase complexity, and overall syntactic sophistication.

TAALES includes five measures for evaluating lexical sophistication: lexical frequency, lexical range, n-gram frequency, academic vocabulary, and psycholinguistic word characteristics. This study focuses on lexical frequency, lexical range, and academic vocabulary as important predictors of language development (Kyle, 2015).

Lexical frequency in TAALES refers to how often a term appears in a text collection. Less frequent words in a reference corpus are considered more sophisticated. Research shows that texts with fewer lexical items are perceived as more challenging and of higher quality (Crossley & McNamara, 2008; Guo, Crossley, & McNamara, 2013). TAALES incorporates 36 frequency indices from various sources, including the BNC and the Kuera-Francis written frequency list (Kyle & Crossley, 2015).

Word range measures how often a term appears in different texts within a collection, providing a more precise estimate of its encounter frequency. Words appearing in more texts are more likely to be encountered. Range measurements have been used to assess writing quality, speaking proficiency, and lexical competence (Kyle & Crossley, 2015).

TAALES academic language measures terms and phrases commonly used in academic settings. The Academic Word List (AWL) by Coxhead (2011) and the Academic Formulas List (AFL) by Simpson-Vlach and Ellis (2010) are key resources. While these lists help identify academic language use, research has not consistently linked academic language use to writing proficiency or lexical sophistication (Kyle & Crossley, 2015).

III. Methodology

To examine the progression of grammatical and lexical complexity in students at various academic levels, a comprehensive analysis of their written essays was conducted. This analysis used two reliable automated tools: TAASSC (Tool for the Automatic Analysis of Syntactic Sophistication and Complexity) and TAALES (Tool for the Automatic Analysis of Lexical Sophistication). This investigation aims to contribute to existing research on language development by providing insights into the progression of grammatical and lexical complexity in academic writing among students at different academic levels. This research project involved forty-eight English major students from Thai Nguyen University of Education, consisting of six males and forty-four females, all around 20 years old. The data for analysis consists of IELTS-based essays written by the students as part of their academic writing assessment.

IV. Findings And Discussions

Results

Complexity

After collecting the data, the researcher created a detailed table showing the Mean values of the two essays, their standard deviations (Sd), and a T-test comparison. The table also includes Cohen's d-effect size to highlight the magnitude of differences between the essay samples. The key findings from the analysis are presented as follows:

Table 2: Linguistic Features Analysis for Essay 1 (E1) and Essay 2 (E2)

Indices	E1 Mean	E1 Sd	E2 Mean	E2 Sd	T Test Value	P value	Cohen's d	Effect Size
Word Count	300.45	39.09	315.32	38.52	0.01	Not significant	0.38	Small
British National Corpus Written Frequency	9.03	1.32	8.82	1.09	0.39	0.001	0.17	Small
Academic Word List	0.07	0.02	0,14	0.02	0.00	Not significant	5.00	Very Large
British National Corpus Written Range	76.12	2.40	66.26	2.38	0.00	Not significant	4.12	Very Large
Concreteness ratings from MRC psycholinguistics database	296.26	7.11	282.88	6.77	0.23	0.001	1.92	Very Large
Adjective complement	0.05	0.04	0.06	0.04	0.32	0.001	0.25	Small
Adverbial clause	0.04	0.02	0.02	0.02	0.00	Not significant	1.00	Large
Clausal complement	0.07	0.04	0.03	0.02	0.00	Not significant	1.26	Large

Modal auxiliary	0.17	0.05	0.14	0.03	0.00	Not significant	0.72	Medium
Passive nominal subject	0.10	0.07	0.08	0.05	0.02	Not significant	0.32	Small
Relative clause modifiers	0.03	0.02	0.02	0.01	0.00	Not significant	0.63	Medium
Adverbial modifiers	0.02	0.02	0.01	0.00	0.00	Not significant	0.63	Medium

The table shows significant growth in academic vocabulary use from Essay 1 (E1 Mean: 0.07) to Essay 2 (E2 Mean: 0.14), with a large effect size (Cohen's d = 5.00). Vocabulary range, measured by the British National Corpus Written Range, decreased from Essay 1 (E1 Mean: 76.12) to Essay 2 (E2 Mean: 66.26), also with a large effect size (Cohen's d = 4.12).

The use of concrete language, based on Concreteness Ratings from the MRC psycholinguistics database, decreased significantly from Essay 1 (E1 Mean: 296.26) to Essay 2 (E2 Mean: 282.88), with an effect size of 1.92. Adverbial clauses decreased by half (E1 Mean: 0.04, E2 Mean: 0.02) with a large effect size of 1.00, and clausal complements also fell (E1 Mean: 0.07, E2 Mean: 0.03) with an effect size of 1.26.

Some features showed only marginal changes between Essay 1 and Essay 2. Modal auxiliary usage, passive nominal subjects, relative clause modifiers, and adverbial modifiers had small effect sizes ranging from 0.32 to 0.63. Though these improvements were less substantial, they still contributed to the overall enhancement of students' writing abilities.

Accuracy

Table 3: Average lexical errors and grammatical errors from both essay sets with effect size.

	Essay 1		**Essay 2**		**Cohens' D**	**Effect size**
	Grammar mistakes	Lexical Mistakes	Grammar mistakes	Lexical Mistakes		
MEAN	6.37	22.81	2.77	6.68	1.23	Large

The table presents an insightful error analysis for Essay 1 and Essay 2, concerning students' improvement in writing complexity and accuracy. In Essay 1, the prevalence of grammar mistakes stands at 6.37, while lexical mistakes account for a substantial 22.81 of the total errors. Conversely, Essay 2 exhibits a notable improvement in both aspects, with grammar mistakes significantly reduced to 2.77 and lexical mistakes showing a considerable decline to 6.68. These findings suggest that students' writing has demonstrated great enhancement in terms of grammatical correctness and lexical precision in Essay 2, compared to their initial performance in Essay 1.

Fluency

With all these mentioned fluency factors in the previous chapter, the following table provides a thorough comparison of the two chosen essays, focusing on their respective writing lengths.

Table 4: Average words counted from both essay sets with effect size.

INDICES	**E1 MEAN**	**E1 SD**	**E2 MEAN**	**E2 SD**	**T TEST VALUE**	**Cohen's *d***	**EFFECT SIZE**
Word Count	300.45	39.09	315.32	38.52	0.01	0.38	Small

The current table illustrates the difference spotted from the two essays, incorporating the indices and data meticulously gathered and reported in the preceding chapters. As evident from the reported table, a notable distinction emerges, showing that the second set of essays, composed three months after the initial one, exhibits a marginal increase of about 15 words in their average length. Upon calculating the effect size through the utilization of Cohen's d, the resulting digit indicates that the observed improvements were of a small magnitude.

Discussion

This study explores the journey of English major students at Thai Nguyen University of Education as they enhance their writing proficiency over three months. It reveals substantial growth in lexical complexity, suggesting that enriching vocabulary plays a crucial role in improving language proficiency. The study also raises questions about teaching approaches, emphasizing the importance of balancing grammatical intricacies with vocabulary enrichment. Additionally, it highlights the effectiveness of automated tools like TAASSC and TAALES in objectively measuring writing improvement, which could revolutionize educational research.

Complexity

The study observes notable enhancements in complexity indices in students' writing, particularly in lexical-based indices, while less improvement is seen in other grammatical aspects. Academic vocabulary usage notably increases, showcasing students' adoption of more sophisticated language choices. Despite minor changes in various grammatical indices, the study emphasizes that mastering complex grammatical elements may require more time and practice. Overall, the findings suggest that vocabulary expansion plays a crucial role in linguistic sophistication, aligning with prior research highlighting the relationship between vocabulary development and overall language refinement.

Accuracy

The study finds a noticeable improvement in writing accuracy, with a reduction in both grammatical and lexical errors between the initial and subsequent essay sets. The average number of grammar errors decreased from 6.37 to 2.77 in Essay 2, while lexical errors dropped from 22.81 to 6.68, indicating enhanced precision in expression. These improvements can be attributed to targeted instruction and intervention over the three-month interval between the essays. Previous research supports this trend, demonstrating that specific teaching approaches lead to improved writing proficiency and reduced error rates. The significant decrease in errors, as indicated by a Cohen's d effect size of 1.23, underscores the substantial gains in writing accuracy observed in the study.

Fluency

The analysis reveals a positive trend in writing fluency, with Essay 2 showing a higher average word count of 315.32 compared to 300.45 words in Essay 1. This modest increase over three months suggests an emerging ability to convey ideas more effectively through longer essays. While measuring word count reflects some improvement in fluency, further research and qualitative analysis are needed to explore the factors driving this enhancement and its implications for writing instruction.

V. Conclusion & Recommendations

The study delves into various facets of writing development, highlighting the need for further research in this area. By employing TAASSC and TAALES, it sheds light on the writing proficiency of English major students at Thai Nguyen University of Education over a three-month period. While providing valuable insights, the study also acknowledges its limitations and suggests avenues for future research.

Using advanced automatic tools enabled the objective measurement of writing proficiency, showcasing technology's potential in educational research. The study emphasizes the positive impact of tailored instructional interventions on writing quality, advocating for a nuanced approach to instruction.

However, the study's quantitative focus calls for a complementary exploration of qualitative aspects to fully assess writing quality. Generalizing findings beyond the study's context requires caution. Future research should aim to deepen understanding in this field.

In conclusion, this study unveils the dynamic journey of writing development among English major students. Its insights pave the way for further investigations into effective writing instruction, contributing to the enhancement of language education practices.

References

[1] Benevento, C., & Storch, N. (2011). Investigating Writing Development In Secondary School Learners Of French. Assessing Writing, 16(2), 97-110. Https://Doi.Org/10.1016/J.Asw.2011.02.001

[2] Bolton, K. (2008). English In Asia, Asian Englises, And The Issue Of Proficiency. English Today, 24(2), 3-12. Https://Doi.Org/10.1017/S026607840800014x

[3] Bulte, B., & Housen, A. (2012). Defining And Operationalizing L2 Complexity. In A. Housen, F. Kuiken, & I. Vedder (Eds.), Dimensions Of L2 Performance And Proficiency: Complexity, Accuracy, And Fluency In Sla (Pp. 21–46). Amsterdam: John Benjamins. Https://Doi.Org/10.1075/Lllt.32.02bul.

[4] Chen, D., & Manning, C. D. (2014). A Fast And Accurate Dependency Parser Using Neural Networks. In Proceedings Of The 2014 Conference On Empirical Methods In Natural Language Processing (Emnlp) (Pp. 740–750).

[5] Coxhead, A. (2011). The Academic Word List 10 Years On: Research And Teaching Implications. Tesol Quarterly, 45(2), 355-362. Https://Doi.Org/10.5054/Tq.2011.254528

[6] Crossley, S. A., Greenfield, J., & Mcnamara, D. S. (2008). Assessing Text Readability Using Cognitively Based Indices. Tesol Quarterly, 42(3), 475-493. Https://Doi.Org/10.1002/J.1545-7249.2008.Tb00142.X

[7] Cumming, A. (2012). Goal Theory And Second-Language Writing Development, Two Ways. In R. Manchón (Ed.), L2 Writing Development: Multiple Perspectives (Pp. 135-164). De Gruyter, Inc. Https://Doi.Org/10.1515/9781934078303.135

[8] Duong, V. A., & Chua, C. S. (2016). English As A Symbol Of Internationalization In Higher Education: A Case Study Of Vietnam. Higher Education Research And Development, 35(4), 669-683. Https://Doi.Org/10.1080/07294360.2015.1137876

[9] Ellis, R. (2009). The Differential Effects Of Three Types Of Task Planning On The Fluency, Complexity, And Accuracy In L2 Oral Production. Applied Linguistics, 30(4), 474-509. Https://Doi.Org/10.1093/Applin/Amp042

[10] Ferris, D., & Hedgcock, S. J. (2005). Teaching Esl Composition: Purpose, Process, And Practice (2nd Ed.). Mahwah, Nj: Lawrence Erlbaum. Https://Doi.Org/10.4324/9781410611505

[11] Gebhard, M., Harman, R., & Seger, W. (2007). Reclaiming Recess: Learning The Language Of Persuasion. Language Arts, 84(5), 419-430.
[12] Guo, L., Crossley, S. A., & Mcnamara, D. S. (2013). Predicting Human Judgments Of Essay Quality In Both Integrated And Independent Second Language Writing Samples: A Comparison Study. Assessing Writing, 18(3), 218-238. Https://Doi.Org/10.1016/J.Asw.2013.05.002
[13] Hyland, K. (2002). Authority And Invisibility: Authorial Identity In Academic Writing. Journal Of Pragmatics, 34(8), 1091-1112. Https://Doi.Org/10.1016/S0378-2166(02)00035-8
[14] Kyle, K., & Crossley, S. A. (2015). Automatically Assessing Lexical Sophistication: Indices, Tools, Findings, And Application. Tesol Quarterly, 49(4), 757-786. Https://Doi.Org/10.1002/Tesq.194
[15] Levy, R., & Andrew, G. (2006). Tregex And Tsurgeon: Tools For Querying And Manipulating Tree Data Structures. Berkeley, Ca: University Of California. Http://Www.Lrec-Conf.Org/Proceedings/Lrec2006/Pdf/513_Pdf.Pdf
[16] Manchon, R. (2012). In Manchón R., Manchón R. (Eds.), L2 Writing Development: Multiple Perspectives (1. Aufl. Ed.). De Gruyter Mouton. Https://Doi.Org/10.1515/9781934078303
[17] Matsuda, P. K., Canagarajah, A. S., Harklau, L., Hyland, K., & Warschauer, M. (2003). Changing Currents In Second Language Writing Research: A Colloquium. Journal Of Second Language Writing, 12(2), 151-179. Https://Doi.Org/10.1016/S1060-3743(03)00016-X
[18] Norris, J. M., & Ortega, L. (2009). Towards An Organic Approach To Investigating Caf In Instructed Sla: The Case Of Complexity: Complexity, Accuracy, And Fluency (Caf) In Second Language Acquisition Research. Applied Linguistics, 30(4), 555-578.
[19] Ortega, L. (2012). Interlanguage Complexity: A Construct In Search Of Theoretical Renewal. In B. Kortmann, & B. Szmrecsanyi (Eds.), Linguistic Complexity (Pp. 127-155). De Gruyter, Inc. Https://Doi.Org/10.1515/9783110229226.127
[20] Penris, W., & Verspoor, M. H. (2017). Academic Writing Development: A Complex, Dynamic Process. In S. Pfenninger & J. Navracsics (Eds.), Future Research Directions For Applied Linguistics (P. 215–242). Bristol: Multilingual Matters. Https://Doi.Org/10.21832/9781783097135-012
[21] Polio, C. (2017). Second Language Writing Development: A Research Agenda. Language Teaching, 50(2), 261-275. Doi:10.1017/S0261444817000015.
[22] Polio, C. G. (2001). Second Language Development In Writing: Measures Of Fluency, Accuracy, And Complexity. Kate Wolfe-Quintero, Shunji Inagaki, And Hae-Young Kim. Honolulu: University Of Hawaii' Press, 1998. Pp. Viii. Studies In Second Language Acquisition, 23(3)
[23] Simpson-Vlach, R., & Ellis, N. C. (2010). An Academic Formulas List: New Methods In Phraseology Research. Applied Linguistics, 31, 487–512. Doi:10.1093/Applin/Amp058.