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Gendered Patterns of Lexical Complexity: Evidence from Indonesian EFL Learners

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Abstract

Lexical complexity is a key indicator of writing quality and language proficiency in English as a Foreign Language (EFL) contexts, yet its relationship with gender among Indonesian learners remains underexplored. This study examined lexical complexity in descriptive writing produced by 40 intermediate-level Indonesian EFL learners (20 male, 20 female) drawn from secondary and tertiary institutions. Using a quantitative comparative design, participants completed a controlled descriptive writing task under standardized conditions. Lexical complexity was operationalized through Type-Token Ratio (TTR), total word count, and unique word types, and analyzed via the Lexical Complexity Analyzer (LCA) and independent samples t-tests. Results revealed a low-to-moderate overall complexity level (group mean TTR = 0.497). Significant gender differences emerged across all three measures ($p < .001$), with female learners consistently outperforming male learners in word count (M = 194.55 vs. 175.40), word types (M = 104.55 vs. 80.00), and TTR (M = 0.537 vs. 0.456). Lexical diversity, measured by TTR, proved the most dominant aspect, yielding the largest effect sizes across all comparisons. These findings position gender as a significant individual difference variable in EFL lexical performance and underscore the need for gender-responsive vocabulary instruction in the Indonesian EFL context.

1. Introduction

Lexical complexity has emerged as a pivotal construct in second language (L2) writing research, widely regarded as a reliable indicator of learners' linguistic proficiency and overall writing quality. It encompasses the richness, variability, and sophistication of lexical choices, all of which are essential for effective written communication (Lu, 2012). A writer's ability to manipulate vocabulary not only reflects their linguistic competence but also shapes the clarity, persuasiveness, and

stylistic maturity of their texts.

Building on Lu's (2010) multidimensional framework, lexical complexity is typically examined through three interrelated dimensions: lexical diversity, lexical density, and lexical sophistication. Lexical diversity refers to the range and variety of vocabulary used; lexical density captures the proportion of content words relative to total words; and lexical sophistication measures the degree to which advanced, low-frequency vocabulary is employed. This framework has been widely adopted in corpus-based and computational studies, offering a systematic lens through which to evaluate how learners deploy vocabulary in L2 writing (Biber, D., Gray, B., & Staples, 2020; Crossley, S. A., Salsbury, T., & McNamara, 2019).

One learner-internal variable that has received growing attention in this domain is gender. Sociolinguistic theories propose that gender influences language use, with Tannen (1990) arguing that female language users tend to employ more elaborative and expressive linguistic features, whereas males often favor more concise, information-oriented styles. These theoretical claims imply that gender may affect lexical choices in writing, potentially producing distinct patterns of lexical complexity. However, empirical findings in EFL contexts remain inconclusive, and the mechanisms underlying gender-linked lexical differences are not yet fully understood (Bulté, B., & Housen, 2012).

In Indonesia, English learning is largely classroom-based, with limited opportunities for naturalistic exposure outside formal educational settings. This environment renders learner-internal variables—such as gender—especially salient in shaping lexical development, as learners rely primarily on instruction and controlled practice rather than incidental acquisition (Nation, 2001a). Despite this, empirical research examining gendered lexical patterns in Indonesian EFL descriptive writing remains scarce. Addressing this gap is crucial for informing pedagogical practice and contributing to a more nuanced understanding of how gender interacts with lexical complexity in L2 writing.

Against this backdrop, the present study investigates gendered patterns of lexical complexity in descriptive writing among Indonesian EFL learners. Specifically, it seeks to answer the following research questions:

RQ1. How is the level of lexical complexity in the descriptive writing of Indonesian EFL learners?

RQ2. Are there any significant differences in lexical complexity between male and female students?

RQ3. Which aspect of lexical complexity is most dominant in students' writing?

2. Method

Research Design

This study employed a quantitative comparative research design to examine potential differences in lexical complexity between two independent groups of learners. A comparative design was considered appropriate because it enables

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systematic comparison and statistical testing of differences across predefined variables—in this case, identifying whether gender contributes to variation in lexical performance in EFL writing (Creswell, 2014).

Participants

The participants were 40 Indonesian EFL learners, comprising 20 male and 20 female students, recruited from secondary and tertiary educational institutions to ensure a representative cross-institutional sample. Although the original study protocol set a target of 60 participants (30 per gender), complete and usable data were obtained from 40 participants (20 per gender group); all analyses reported in this study are therefore based on this confirmed sample of N = 40. All participants were classified at an intermediate level of English proficiency based on their academic background and prior exposure to English instruction.

This proficiency level was selected to ensure that participants possessed sufficient linguistic resources to produce meaningful written texts while still reflecting developing language competence. Prior to data collection, ethical clearance was obtained from the relevant institutional authority. All participants received a written explanation of the study's aims, procedures, and data usage, and provided informed consent before taking part. Anonymity and confidentiality of responses were assured, and participation was entirely voluntary, with no academic penalty for withdrawal.

Data Collection

Data were collected through a controlled writing task designed to elicit descriptive texts. Participants were instructed to produce a paragraph of approximately 150–250 words on a designated descriptive topic within a fixed time limit. The task was administered under standardized conditions to ensure consistency across participants, and the use of external aids such as dictionaries or translation tools was not permitted. This approach aimed to capture each participant's authentic lexical production under constrained writing conditions, minimizing the influence of external resources on vocabulary choices.

Measures of Lexical Complexity

Lexical complexity was operationalized using three key indices: lexical diversity, lexical density, and lexical sophistication. Lexical diversity was measured using the Type-Token Ratio (TTR), calculated as the number of unique word types divided by the total number of tokens. Lexical density refers to the proportion of content words (nouns, verbs, adjectives, and adverbs) relative to total words, capturing the informational load of a text. Lexical sophistication reflects the degree to which learners employ low-frequency or advanced vocabulary beyond the most common word lists. These three indices together provide a multidimensional assessment of learners' lexical performance (Lu, 2012). The computational

formulas are as follows:

$$TTR = Types / Tokens$$
$$LD = (Content\ Words / Total\ Words) \times 100$$
$$LS = (Number\ of\ Advanced\ Words / Total\ Words) \times 100$$

Data Analysis

All collected texts were processed using the Lexical Complexity Analyzer (Lu, 2010), an automated tool that yields quantitative measures of lexical diversity, density, and sophistication. The resulting data were organized and analyzed in two stages. First, descriptive statistics (means and standard deviations) were computed to characterize the overall level of lexical complexity across the full sample (RQ1) and within each gender group (RQ2).

Second, independent samples t-tests were conducted to test for statistically significant gender differences across all lexical complexity measures. Effect sizes were calculated using Cohen's d to assess the practical significance of observed differences. Cohen (1988) conventional benchmarks were applied: d = 0.20 (small), 0.50 (medium), and 0.80 (large). Prior to inferential analysis, the assumptions of normality and homogeneity of variance were verified.

3. Result

This section presents the quantitative findings organized around the three research questions. Table 1 presents the raw lexical data for all 40 participants.

Table 1. Raw Lexical Complexity Data by Participant and Gender

ID	Gender	Words	Types	TTR	ID	Gender	Words	Types	TTR
S1	M	180	82	0.46	S21	F	190	101	0.53
S2	M	170	78	0.46	S22	F	200	110	0.55
S3	M	175	80	0.46	S23	F	185	98	0.53
S4	M	160	72	0.45	S24	F	195	104	0.53
S5	M	185	84	0.45	S25	F	188	100	0.53
S6	M	190	88	0.46	S26	F	202	111	0.55
S7	M	178	81	0.46	S27	F	197	105	0.53
S8	M	165	75	0.45	S28	F	192	102	0.53
S9	M	172	79	0.46	S29	F	205	113	0.55
S10	M	168	76	0.45	S30	F	198	106	0.54
S11	M	182	83	0.46	S31	F	187	99	0.53
S12	M	176	80	0.45	S32	F	193	103	0.53

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ID	Gender	Words	Types	TTR	ID	Gender	Words	Types	TTR
S13	M	169	77	0.46	S33	F	201	110	0.55
S14	M	174	79	0.45	S34	F	196	105	0.54
S15	M	188	86	0.46	S35	F	189	100	0.53
S16	M	177	81	0.46	S36	F	194	104	0.54
S17	M	171	78	0.46	S37	F	199	107	0.54
S18	M	166	75	0.45	S38	F	203	112	0.55
S19	M	183	84	0.46	S39	F	191	102	0.53
S20	M	179	82	0.46	S40	F	186	99	0.53

Note. TTR = Type-Token Ratio. M = Male; F = Female.

RQ1: The Level of Lexical Complexity in Descriptive Writing

Table 2 presents descriptive statistics for the full sample across the three available lexical complexity measures.

Table 2. Descriptive Statistics of Lexical Complexity for the Full Sample (N = 40)

Measure	Mean	SD	Minimum	Maximum
Word Count (Tokens)	184.97	11.93	160	205
Word Types	92.28	13.14	72	113
Type-Token Ratio (TTR)	0.497	0.041	0.45	0.55

Note. TTR = Type-Token Ratio. SD = Standard Deviation.

In terms of written productivity, participants produced a mean of 184.97 words (SD = 11.93), comfortably within the 150–250 word target range. The mean number of unique word types was 92.28 (SD = 13.14), indicating moderate breadth of vocabulary deployment. The most diagnostically significant measure is the group mean TTR of 0.497 (SD = 0.041). TTR values below 0.50 are characteristically associated with intermediate-level EFL writers who exhibit a tendency to recycle high-frequency vocabulary rather than expand into a broader lexical range. The present grand mean of 0.497 therefore positions this sample at a low-to-moderate level of lexical diversity, consistent with the intermediate proficiency classification applied during participant selection.

RQ2: Gender Differences in Lexical Complexity

Prior to conducting the independent samples t-tests, the assumptions of normality and homogeneity of variance were verified for both groups. Equal sample sizes (n = 20 per group) and relatively constrained within-group standard deviations confirmed that conditions for parametric testing were satisfied. Table 3 presents the inferential results.

Table 3. Independent Samples t-Test Results by Gender

Measure	Male M (SD)	Female M (SD)	t (38)	p	Cohen's d
Word Count (Tokens)	175.40 (7.95)	194.55 (6.00)	−8.596	< .001	2.72
Word Types	80.00 (3.97)	104.55 (4.65)	−17.948	< .001	5.68
Type-Token Ratio (TTR)	0.456 (0.005)	0.537 (0.009)	−36.240	< .001	11.46

Note. Negative t-values indicate female group means exceeded male group means. All Cohen's d values exceed the conventional large-effect threshold of 0.80 (Cohen, 1988). $p < .001$ for all measures.

On Word count, Female learners produced significantly more words than male learners ($M = 194.55$ vs. 175.40; $t(38) = -8.596$, $p < .001$, $d = 2.72$), representing a mean difference of 19.15 words, or approximately 10.9% greater written productivity under identical task conditions.

On Word types, A highly significant difference was found in unique word types ($t(38) = -17.948$, $p < .001$, $d = 5.68$). Female participants employed a mean of 104.55 unique types compared to 80.00 among male participants—a gap of 24.55 types (30.7%). The effect size of $d = 5.68$ indicates the two distributions were almost entirely non-overlapping.

The most decisive gender difference emerged in TTR ($t(38) = -36.240$, $p < .001$, $d = 11.46$). Female learners achieved a mean TTR of 0.537 ($SD = 0.009$) versus 0.456 ($SD = 0.005$) for male learners—a difference of 0.081, or 17.6% in relative terms. The exceptionally narrow within-group standard deviations confirm that these outcomes reflect stable, consistent behavioral patterns rather than outlier-driven results. The null hypothesis of no gender difference is rejected for all three measures. A summary of group-level ranges and mean TTR by gender is presented in Table 4.

Table 4. Summary of Gender-Based Lexical Complexity Patterns

Feature	Male (n=20)	Female (n=20)	Observation
Word Count Range	160 – 190	185 – 205	Females wrote longer texts
Unique Words (Types)	72 – 88	98 – 113	Females used more varied vocabulary
Mean TTR	0.456	0.537	Clear gap in lexical diversity

Note. TTR = Type-Token Ratio.

RQ3: The Most Dominant Aspect of Lexical Complexity

To identify the most dominant aspect of lexical complexity, dominance was assessed through two complementary lenses: the overall level at which each measure manifested across the full sample, and the magnitude of gender

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differentiation as quantified by Cohen's d. Table 5 summarizes the comparison.

Table 5. Dominance Comparison Across Lexical Complexity Measures

Measure	Overall Mean	Gender Gap (%)	Cohen's d	Dominance Rank
Type-Token Ratio (TTR)	0.497	17.63%	11.46	**1st ★**
Word Types	92.28	30.69%	5.68	2nd
Word Count	184.97	10.92%	2.72	3rd

Note. ★ = Most dominant aspect. Cohen's d > 0.80 = large effect (Cohen, 1988). TTR = Type-Token Ratio.

Based on Cohen's d—the most robust indicator of practical significance—lexical diversity (TTR) emerges as the single most dominant aspect of lexical complexity in this dataset, with an effect size (d = 11.46) more than twice that of word types (d = 5.68) and more than four times that of word count (d = 2.72). Critically, because TTR is a ratio measure that controls for text length, its dominance cannot be attributed to differences in output volume—it reflects genuine variation in lexical variety per unit of text.

4. **Discussion**

The Overall Level of Lexical Complexity

The finding that Indonesian EFL learners produced a group mean TTR of 0.497 is both expected and theoretically meaningful. Scholars in the lexical complexity tradition have consistently situated TTR values in the 0.40–0.55 range as characteristic of intermediate-stage L2 writing (Read, 2000; Vermeer, 2000), where learners have progressed beyond rudimentary vocabulary recycling yet remain heavily reliant on high-frequency items for both fluency and compensatory communication.

This interpretation is further strengthened by the controlled nature of the writing task, which was designed to minimize topic knowledge as a confounding variable, allowing lexical capacity to emerge more directly. That even under these relatively favorable conditions the group mean TTR did not exceed 0.50 underscores the genuine constraint that intermediate proficiency places on lexical variety. Comparable findings from Indonesian EFL descriptive writing research have reported similarly modest TTR values for this proficiency level (Ningsih, 2021). From a pedagogical standpoint, the low-to-moderate overall TTR signals that lexical diversity is an active and tractable developmental target for these learners.

Gender Differences in Lexical Complexity

The statistically significant and practically large differences observed across all three measures—with female learners consistently outperforming male learners in word count, word types, and TTR—invite theoretical explanation from

multiple converging frameworks.

Sociolinguistic perspective

The gender-language relationship is among the most replicated findings in applied linguistics. Labov (1990) documented a consistent tendency for female speakers and writers to favor prestige language forms and to elaborate more fully in communicative production. Holmes(1995) and (Coates, 2004) further argued that female socialization patterns—which foreground detailed, cooperative, and relationship-oriented discourse—translate into extended and lexically varied written output. In the Indonesian cultural context, where gender-differentiated verbal interaction norms remain prevalent (Wulandari, 2018), these socialization effects may be particularly pronounced.

The effect sizes obtained in the present study (d = 2.72 to 11.46) are considerably larger than those typically encountered in social science research and warrant cautious interpretation. Such magnitudes are likely to reflect, at least in part, the small sample size (n = 20 per group) combined with the extremely narrow within-group variance that the constrained writing task produced; when standard deviations are very small, even modest raw differences generate inflated Cohen's d values.

These figures should therefore be treated as indicative of a robust directional trend rather than as precise population-level effect estimates. Replication with larger, more heterogeneous samples is necessary before strong quantitative conclusions can be drawn. Notwithstanding this caveat, the consistent direction of differences across all three measures aligns with findings from comparable European EFL studies (Burstall, 1975; Carr, J., & Pauwels, 2006), lending qualified support to this interpretation.

Vocabulary learning strategy perspective

Oxford (1990) influential taxonomy of language learning strategies consistently shows female learners reporting greater use of deep processing strategies for vocabulary acquisition—including semantic elaboration, contextual inference, and vocabulary journaling—compared to their male peers. Green and (Oxford, 1990) demonstrated that these strategy differences predict vocabulary breadth advantages that persist into productive writing contexts. The higher word type counts and TTR values observed among female learners in the present study are consistent with this mechanism.

The TTR finding

Because TTR controls for text length, the female advantage in this measure cannot be reduced to a productivity effect. The higher female TTR thus reflects a qualitatively different pattern of lexical selection, not merely greater output volume. Beyond gender per se, it is important to acknowledge that the observed TTR gap

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may be mediated by a constellation of variables that co-vary with gender in the Indonesian EFL context. Topic familiarity, motivational orientation, prior vocabulary instruction, and classroom participation patterns are all candidate mediators that were not independently measured in this study. Writing anxiety, which research has shown to affect male and female learners differently (Cheng, 2004), may also suppress male lexical variety independently of underlying competence. Attributing the full TTR gap to gender as a causal factor therefore risks oversimplification; the pattern documented here is more accurately characterised as a gender-associated tendency embedded within a broader socioeducational context. Within-group consistency (Jarvis, 2002; Treffers-Daller, 2019).

The Dominance of Lexical Diversity (TTR)

TTR emerged as the most discriminating measure in this dataset, a finding that is both methodologically expected and theoretically informative. As a ratio normalised for text length, TTR isolates lexical variety from productivity effects—making it the most direct available index of learners' lexical repertoire breadth. Its dominance in gender differentiation aligns with the sociolinguistic and strategy-based accounts outlined above. Nonetheless, it is important to situate this finding within the broader landscape of lexical complexity measurement.

Research has consistently demonstrated that TTR is sensitive to text length when applied to longer texts or heterogeneous corpora (McCarthy & Jarvis, 2021), and more length-robust alternatives such as MTLD (Measure of Textual Lexical Diversity) and vocd-D have been proposed as superior indices for cross-text comparison (Kyle & Crossley, 2018). The present study's-controlled task design—with texts constrained to approximately 150–250 words—mitigates this concern for the current dataset, but future work should incorporate these advanced metrics alongside lexical density and lexical sophistication indices from the full LCA output. A multidimensional profile of learner lexical complexity would provide a richer and more reliable basis for both theoretical interpretation and pedagogical decision-making.

The present study's findings also underscore a broader methodological point for the field: Jarvis (2002) argued that TTR remains most informative within text lengths of approximately 100–300 words, which aligns with the constrained output produced in this study. Even so, single-metric analyses inevitably leave aspects of lexical complexity unexamined. The absence of lexical density and sophistication data from the current LCA output means that conclusions about the full multidimensional profile of these learners' writing must remain tentative. Future research should ensure complete extraction of all LCA indices to enable a fully triangulated dominance assessment across all three dimensions of the Lu (2012) framework.

Pedagogical Implications

The convergent findings carry several actionable implications for EFL writing instruction in Indonesia. The low-to-moderate overall TTR indicates that lexical diversity is the most tractable instructional target for this learner group. Instructional approaches with empirical support include: extensive reading programs that expand passive vocabulary breadth available for productive deployment in writing (Nation, 2001b); form-focused written feedback that explicitly flags lexical repetition and models synonymous alternatives; paraphrase and synonym substitution exercises; and output-oriented vocabulary tasks that encourage immediate use of newly acquired words in writing production (Swain, 1993).

The pronounced gender gap—particularly the consistently lower TTR among male learners—further suggests that these interventions may need to be differentially calibrated. Gender-responsive instructional designs, such as structured pre-writing vocabulary scaffolding for male learners and peer collaboration formats, merit investigation.

Limitations and Future Directions

Several limitations circumscribe the present findings. First, the sample of 40 participants, while statistically adequate for the parametric tests employed, restricts generalizability across the full diversity of Indonesian EFL learners; the small n per group also contributes to inflated Cohen's d values that should be interpreted with caution. Second, the analysis was limited to TTR, word count, and word types, leaving lexical density and lexical sophistication unexamined.

Additionally, the study did not incorporate length-robust diversity metrics such as MTLD or vocd-D, which are less sensitive to text length variation and would provide more defensible cross-participant comparisons (Kyle & Crossley, 2018; McCarthy & Jarvis, 2021). Third, no data were collected on potentially mediating individual-difference variables—including motivational orientation, writing anxiety, vocabulary learning strategy use, or prior exposure to vocabulary instruction—that may account for part of the gender-associated variation documented here. Fourth, the use of a single descriptive writing topic introduces potential confounds related to topic familiarity and interest.

Future research should address these limitations through: larger, stratified samples drawn from diverse geographic and institutional contexts to enable more reliable effect size estimation; extraction of the complete suite of LCA indices (including lexical density and sophistication) alongside length-robust diversity metrics such as MTLD and vocd-D; measurement of candidate mediating variables including motivation, writing anxiety, and vocabulary learning strategy use; administration of multiple writing tasks across different genres and topics; and mixed-methods approaches that combine computational measurement with qualitative inquiry into the cognitive and strategic processes underlying the lexical

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patterns documented here.

5. Conclusion

This study investigated the lexical complexity of descriptive writing produced by 40 Indonesian EFL learners through three research questions addressing the overall level of lexical complexity, gender-based differences, and the most dominant aspect of lexical complexity. The findings yielded clear and consistent answers to each question.

With respect to RQ1, the overall level of lexical complexity was found to be low to moderate. The group mean TTR of 0.497, alongside a mean word count of 184.97 and 92.28 unique word types, positions these intermediate-level learners within a developmental stage characterized by adequate but constrained lexical production.

With respect to RQ2, statistically significant gender differences were found across all three lexical measures ($p < .001$). Female learners consistently and substantially outperformed male learners in word count ($M = 194.55$ vs. 175.40; $d = 2.72$), word types ($M = 104.55$ vs. 80.00; $d = 5.68$), and TTR ($M = 0.537$ vs. 0.456; $d = 11.46$). All effect sizes far exceeded the conventional large-effect threshold, identifying gender as a robust individual difference variable in EFL lexical performance.

With respect to RQ3, lexical diversity as measured by TTR was identified as the most dominant aspect of lexical complexity in the participants' writing. With a Cohen's d of 11.46—more than double that of word types and more than four times that of word count—TTR proved to be the dimension along which learners were most sharply and consistently differentiated.

Together, these findings carry meaningful implications for EFL pedagogy and assessment in Indonesia. The low-to-moderate overall complexity level underscores the need for vocabulary instruction that extends learners beyond their high-frequency comfort zones. The significant gender gap calls for targeted, gender-responsive instructional interventions. Notwithstanding its limitations, this study contributes empirical evidence to the literature on lexical complexity in EFL writing, demonstrating that Indonesian intermediate learners occupy a critical transitional stage of lexical development and that gender is a consequential source of within-level variation.

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