

Lexical and Syntactic Changes in First-Year EAP Student Writing

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Abstract

The question of how English for Academic Purposes (EAP) student writing changes over time is one of notable importance to researchers and educators. While it has been established that academic vocabulary and complex structures play an important role in how students perform and are assessed in written assignments, the degree to which those areas develop as students progress through higher education is less well understood. This study compares the writing of university students near the start and end of their first year of university and EAP study and finds that while use of both academic vocabulary and more complex structures increases during that time, much of the development, particularly in terms of vocabulary, can be explained based on the different task types and topics that formed the basis of each written submission.

As one of the skills which is an essential element of success in university, the development of writing skills among ESL students has been the subject of a significant amount of scholarship. Despite that body of work, questions remain pertaining to how the skills of EAP students change during university study and EAP instruction. Knoch et al. (2015) argue that “taken together, available research on L2 writing development following formal instruction suggests that such instruction results in a significant increase in band/composition scores. However, discourse measures showed mixed results following instruction” (p. 41). The present study hopes to contribute to the understanding of how lexical complexity and vocabulary in first-year student writing changes by comparing student writing before and after a 30-week intensive EAP course at a bilingual university in Tokyo, Japan.

Literature Review

Academic Vocabulary

The use of academic language in writing is both a key component of the skill itself and seen by ESL students as one of the more challenging aspects of academic composition in English (Evans & Morrison, 2011). It is also “perhaps the most commonly used linguistic feature to analyse the quality of texts” (Crossley, 2020, p. 14), particularly in ESL writing. Use of appropriate vocabulary in academic writing has been linked to better academic performance on writing tasks (Csomay & Pardes, 2018) and GPA (Crossman, 2018). One of the key developments in the field was the creation of the Academic Word List by Coxhead (2000). The list is the result of a corpus study aimed at discovering the most commonly used lexical items in academic writing and consists of 570 words. In expert academic writing,

words on the AWL account for a rough average of 10% of all lexical items, with some variation between disciplines: Arts (9.3%), Commerce (12.0%), Law (9.4%) and Science (9.1%) (Coxhead, 2000).

Empirical studies using productive or receptive vocabulary tests based on the AWL or similar lists have produced mixed results. Some short-term studies (6 weeks) uncovered notable growth of vocabulary and links between vocabulary knowledge and GPA (Crossman, 2018), while others (6 months) found little change (Cobb & Horst, 1999). Longer studies found modest yet statistically significant gains in both productive and receptive academic vocabulary after three years of study (Ozturk, 2015). All three studies above hypothesised that a ceiling effect hindered the vocabulary growth of students with higher scores at the start of each investigation.

There is a considerable body of research (summarised in Table 1) on academic vocabulary use and growth in the academic writing of EAP students. The most common methodological approach is that of a test-retest design using writing produced under timed conditions such as assessment or diagnostic tasks. The time between tests in these studies ranges from one month to three years, primarily in university settings. Despite most studies noting an overall increase in the use of items from the AWL in student writing, few of these results were statistically significant. The main exception is an inquiry by Mazgutova and Kormos (2015), which discovered statistically significant differences in two groups of students after a one-month intensive pre-sessional EAP course despite the classes having no explicit focus on vocabulary development.

An additional way in which researchers have sought to assess the development of student writing is by measuring its syntactic complexity. Crossley et al. (2011) have argued that complex structures are one of the "productive predictors of L2 writing proficiency" (p. 116). Similar to use of academic vocabulary, increased use of sophisticated structures in academic writing has been linked to proficiency and better performance in assessed writing (Crossley et al., 2011; Lu, 2011; McNamara et al., 2010).

The main unit of measurement in this regard is the T-unit, which Hunt (1966) defined as "one main clause plus whatever subordinate clauses are attached to it" (p. 737). The ability to produce a longer T-unit is thought to be indicative of more proficient writing. Mean length of T-unit (MLTU) is a standard measure in assessing the complexity of written work (Crossley, 2020).

Research into syntactic development among university EAP and ESL students has noted few changes in MLTU in test/retest studies. Table 2 shows that while MLTU increased in some cases, no previous studies have found changes reaching statistical significance.

Summary and Rationale for Current Study

In summary, it can be said that while lexical and syntactic complexity are seen as positively influencing grades, the link between EAP instruction or university study and lexical and syntactic development is less clear. A possible avenue of research into vocabulary and syntactic complexity that has of yet been underexplored is ESL academic writing in non-timed conditions. With very few exceptions, the surveys reported above have all used some kind of timed essay as the unit of analysis. Though the utility of such data, particularly in terms of the validity in a test-retest approach, is clear, it also seems axiomatic, and has been suggested in research (Weigle & Frigal, 2015), that student writing in test/timed conditions produces different results from the written tasks they are required to produce as part of their university studies. Additionally, the present study also offers possible insight into the effects of a longer, semi-intensive parallel EAP course on student writing. Past studies have been drawn from learners in a variety of situations, though the study in which students had the longest EAP

Lexical and Syntactic Changes in EAP Writing

training seems to be Storch and Tapper (2009), which followed students through a 12-week course that had three contact hours per week.

Table 1

Summary of Studies Examining Academic Vocabulary Use in ESL Student Writing

Study	Study Duration	Instrument	AWL Use Test #1	AWL Use Test #2
Knoch et al. (2014)	1 year	Diagnostic writing	7.4%	7.7%
Knoch et al. (2015)	3 years	Diagnostic writing	7.67%	8.12%
Mazgutova & Kormos (2015)	1 month	Timed writing	Higher group: 5.2% Lower group: 3.61%	6.82% 5.78%
Storch (2009)	12 weeks	Diagnostic writing	5%	5%
Storch & Tapper (2009)	12 weeks	Writing test	Higher group: 8.05% Lower group: 7.85%	9.35% 9.34%
Xudong et al. (2010)	11 weeks	Diagnostic writing	5.69%	6.75%

Measures of Syntactic Complexity in Academic Writing

Table 2

Summary of Studies Examining T-unit length in ESL Student Writing

Study	Study Duration	Instrument	MLTU Test #1	MLTU Test #2
Knoch et al. (2014)	1 year	Diagnostic writing	17.54	19.98
Knoch et al. (2015)	3 years	Diagnostic writing	16.27	16.96
Mazgutova & Kormos (2015)	1 month	Timed writing	Higher group: 17.04 Lower group: 16.26	16.44 16.93
Storch (2009)	12 weeks	Diagnostic writing	15.10	14.93
Storch & Tapper (2009)	12 weeks	Writing test	Higher group: 16.93 Lower group: 14.98	14.60 15.91

As detailed below, this study is both longer and includes the data of students who received over 8 hours of EAP instruction per week during the study period. Further, researchers in the field have also noted a lack of longitudinal studies (Crosthwaite, 2016). In a review study, Ortega (2003) suggested that MLTU tends to increase only after one year of study. The present study seeks to contribute to the understanding of lexical and syntactic development in EAP student writing by comparing two pieces of authentic (i.e., produced as part of course work and written outside the classroom) written work of EAP students collected approximately 25 weeks apart.

Methodology

Participants and Setting

This study was conducted using the written assignments from first-year students attending a private bilingual liberal arts university in Tokyo, Japan. Upon entering the university, students are separated into four streams: one (advanced) to four (low intermediate) of EAP courses. The writing from level three students, those who score between 450–580 on the paper-based TOEFL test or 5–6.5 on the IELTS was used in this study. The EAP courses are conducted in parallel to content classes students take in the College of Liberal Arts. Students in this stream generally have eight 70-minute periods of EAP instruction per week, divided between academic reading and writing (three periods), reading and content analysis (two periods) and academic skills (three periods) for three 10-week semesters. Students take the academic reading and writing and reading and content analysis classes in each semester, but with a different instructor. The content of the academic skills classes varies between semesters, and most are mandatory. In broad terms, neither vocabulary nor academic language is a key component of the program, though all students are required to take English for Written Communication, an academic skills course designed to raise awareness and improve use of features of academic written English such as hedging, formality and nominalisation.

Data

The data for this investigation is the final drafts of written assignments that students produced as part of their course work for the academic writing and reading course. The first assignment was submitted in the third week of the spring (first) semester, and the second assignment was submitted towards the end of the winter (third and final) semester, after roughly 25 weeks of EAP classes. For both assignments, students were required to submit a first draft (ungraded in spring and graded in winter) and had the opportunity to receive individual feedback from their instructor before submitting the final drafts. As such, these texts should be considered to represent the best possible performance from the students at each stage of the course. The prompts for each task are listed below.

Spring Writing Prompt:

Write one paragraph. In the paragraph, describe one difference between high school and university. Give reasons to explain why this difference exists. Write 200 words $\pm 10\%$

Winter Writing Prompt:

Lexical and Syntactic Changes in EAP Writing

Write an Argumentative essay that identifies an ethical issue in bioethics and argues for a position by considering reasons and counterarguments. The paper should consider the principles of bioethics (autonomy, beneficence, nonmaleficence and justice).

Or

Write a Problem-Solution essay that identifies an ethical issue and explains several important problems that exist, and offers a solution. The paper should consider the principles of bioethics (autonomy, beneficence, nonmaleficence and justice).

Write 1000–1200 words $\pm 10\%$ and use 8 sources.

The return rate for the study was rather low. Approximately 90 students were asked to participate in the study, and 28 elected to do so. Many students who submitted the spring assignment failed to submit their winter assignment when contacted via email. Participation was voluntary, and no compensation was offered.

The texts were edited to remove extraneous information (i.e., titles, figures, tables and works cited), anonymised and grouped together to form two corpora, one for each writing task. There were 6134 words in the spring corpus and 33 159 in the winter corpus, a total of 39 293 words. Regarding the winter writing prompt, 20 of the 28 winter essays responded to the argumentative prompt.

Data Analysis

A variety of software applications were used to analyse the data in this study. The use of academic vocabulary in both corpora was assessed by use of the AntWordProfiler (Anthony, 2022) using the AWL (Coxhead, 2000). The Tool for the Automatic Analysis of Syntactic Sophistication and Complexity (TAASSC) (Kyle, 2016), which incorporates elements of the L2 Syntactical Complexity Analyzer (L2SCA) (Lu, 2010), was used to calculate the mean length of T-units (MLTU). Finally, JASP (JASP Team, 2022) was used to obtain descriptive and inferential statistics for key measures through use of paired *t*-tests.

Validity Constraints

The main factor which negatively affects the validity of this study is the lack of symmetry between the spring and winter corpora. Though both corpora represent the academic written work of the same group of students produced under similar circumstances, they nonetheless represent notably different writing tasks. The spring task is a short, relatively simple task based around an easily accessible topic which any university student should be able to respond to with a minimum of background knowledge or research. Furthermore, it does not require the use of outside resources. In some ways, the task is quite similar to those found on standardised English language exams, though the students had few limitations on how much time they could devote to the task and several opportunities to improve it based on individual feedback. In contrast, the winter essay is a longer piece of writing based on the use of sources, presented in a different mode (argumentative or problem-solution) and concerns a far more complex field (bioethics). Furthermore, the winter corpus consists of two different text types and allows students a free choice of specific topic. Thus, as the two corpora are built of texts responding to two different prompts with different specifications, this severely limits the degree to which any difference between the corpora can be attributed to developments in student proficiency.

A second constraint is the number of variables which could account for any potential development among the students. As stated above, students in this cohort take a variety of courses as part of their EAP study. While all instructors base their teaching around the same

syllabus and major assignments do not vary between the individual classes, students have at least nine different teachers for the primary classes (i.e., those that meet more than once a week) in the academic year. In addition, there is some variation in the academic skills course that the students take. A further consideration is the content classes that the students take in parallel to their EAP course load, which can be conducted in English or Japanese. As such, ascribing any development in student proficiency to any one factor is fraught with difficulty, and this study makes no attempt to do so.

Results

AWL Use

The results for use of lexical items from the AWL are presented in Table 3. Mean usage in the spring corpus was 5.68% in spring and 8.61% in winter, a statistically significant difference as measured by a paired *t*-test. A great deal, if not all, of that difference can be ascribed to the task type, topic and prompt. The relative simplicity of the spring writing topic simply does not require advanced vocabulary. Many of the differences between university and high school can be elucidated without the use of technical or specialised vocabulary.

Table 3

AWL Use in Spring and Winter Corpora

Spring	<i>SD</i>	Winter	<i>SD</i>	<i>t</i>	<i>p</i>
5.68	2.418	8.67	2.135	4.833	< .001

Of the most common AWL items in the spring corpus (Table 4), only *lecture*, *schedule(s)* and *academic* can be said to have a direct connection to the topic, and the remaining items are instead general academic words or, in the case of *contrast* and *conclusion*, more related to discourse than lexis. The range figures, which show that none of the most common words is found in more than 50% of submissions, lend further weight to the notion that the task, while not restricting use of more advanced lexical items, does not require their use.

Use of AWL items is higher in the winter corpus. The main explanation of greater use in this corpus seems to be the essay topic and prompt. The topic for the winter semester (bioethics) is both more complex and incorporates three broad fields, biology, ethics and the topic itself. The links between most of the frequently occurring items (see Table 4) in this corpus and those fields are quite clear. Terms such as *ethical*, *principle*, *perspective* and *theory* are all related to ethics and items linked to biology or science more broadly, including *technology*, *medical* and *research*, are also among the most frequent items. Combined with *designer* (used for *designer babies*, a common essay topic), terms with a connection to the topic account for eight of the ten most common items, compared to three words from the spring corpus that fit the same criteria.

In further contrast to the spring corpus, seven of the ten most common words in the winter corpus appear in more than 50% of papers, suggesting that the task may necessitate the use of academic vocabulary. The influence of the prompt itself is also seen in the results. Three items in the prompt (*ethical*, *issue* and *principle*) are all within the 10th percentile of common items.

Table 4
Most Common AWL Items in Spring and Winter Corpora

Item	Spring		Item	Winter	
	Frequency	Range		Frequency	Range
required	13	9	designer	82	3
contrast	12	12	technology	63	11
conclusion	11	11	ethical	60	19
diversity	10	6	principle	59	18
adults	10	2	benefits	49	14
lectures	8	4	medical	48	15
schedules	7	5	issues	46	17
academic	7	5	research	38	11
schedule	7	5	perspective	36	16
significant	6	6	theory	33	16

Syntactic Complexity

Table 5 displays the results for syntactic complexity, as measured by MLTU. In comparing spring and winter writing, there is an average of two additional words per T-unit, a statistically significant change. It is possible that some of this difference can surely be accounted for by the difference in task types. As noted, the spring writing assignment is

Table 5
Mean Length of T-unit in Spring and Winter Corpora

Spring	<i>SD</i>	Winter	<i>SD</i>	<i>t</i>	<i>p</i>
16.46	3.28	18.79	4.00	2.96	.003

relatively simple and therefore it can be expected that the task may be adequately completed without use of complex structures. In paragraphs with low average MTLU, several patterns of short sentences and T-units are evident. The first is the use of simple descriptions of either high school or university.

There are many things that students have to memorise. (Paper 2, one T-unit, nine words)

It can be said that they are controlled by others. (Paper 11, one T-unit, 10 words)

First, how to teach them is different. (Paper 21, one T-unit, 7 words).

Similarly short utterances are evident when signalling a transition to the section of the paragraph that explains the reasons for the differences and in providing reasons themselves.

There are several reasons for this difference. (Paper 2, one T-unit, 7 words)

There are several reasons for this dissimilarity. (Paper 12, one T-unit, 7 words)

Lexical and Syntactic Changes in EAP Writing

There are mainly two reasons. (Paper 21, one T-unit, 5 words)

The second reason is that university is a place to prepare for society. (Paper 3, one T-unit, 13 words)

For that reason, teachers try to get them ready for the entrance examinations. (Paper 12, 13 T-unit, 7 words)

Sentences showing cause and effect also tend to be less complex.

Thus, professors do not tell them all the answers, and they just tell them the attractive parts of their specialties. (Paper 12, two T-units, nine and eleven words)

Therefore, it is necessary to discuss the topic with other students to get deep thinking. (Paper 2, one T-unit, 15 words)

Therefore, teachers and parents decide their schedules mostly. (Paper 11, one T-unit, eight words)

Though longer sentences do exist in papers with low MTLU score, they are typified by use of coordinating conjunctions.

In contrast, studies at university require you to think deeply and critically, and at the end of your research, you may write a graduation thesis to show your efforts. (Paper 12, two T-units, 12/17 words)

Secondary schools are places where students learn fundamental skills to prepare for university, but colleges can learn academic skills to contact civilisation. (Paper 3, two T-units, 13/nine words)

While not typical, longer, more complex structures can be found in the spring corpus.

In papers with longer average MTLU, several patterns can be seen. First is the inclusion of both a difference between university and high school and the reason for that difference in the same sentence.

Hence, the choice of courses exists to let university students deepen their learning and to help them to prepare after graduation, being responsible adults in the new stage of their lives. (Paper 1, one T-unit, 31 words)

Since one of the main missions of high school is to enroll students into higher institutions such as universities, colleges and workplaces, [;] therefore, highschool requires students to remember materials from textbooks that enables them to pass examinations and create foundations for their new field of study. (Paper 19, two T-units, 22/24 words)

However, they are expected to take responsibility for what they do and do not do for the consequences of decisions because the university is a voluntary place to study (Paper 17, one T-unit, 29 words).

A further pattern resulting in longer utterances includes information on both types of schools in one sentence.

In addition, the lessons of high schools concentrate on memorising thousands of terminologies, not thinking deeply whereas lectures at universities focus on thinking, discussing specific topics with the same faculty students. (Paper 23, one T-unit, 31 words).

In conclusion, high schools are compulsory places for students to learn where the weight of responsibility on their own would be much lighter than those in the university, which is a place to learn of their own volition contrastingly. (Paper 17, one T-unit, 39 words).

Lexical and Syntactic Changes in EAP Writing

Thus, while the spring task does not necessarily require the use of complex structures, it also does not restrict their use, though the degree to which this possibility affects these results is unclear.

Similarly, in the winter corpus several elements related to the task are accomplished using differing lengths of sentences and T-units. Firstly, reporting statistics or direct quotes (neither are a requirement in the assignment brief) shows different levels of complexity used to include examples.

For example, according to Stanford University, 98% DNA of mice is equivalent to humans' DNA (Stanford Medicine). (Paper 13, one T-unit, 17 words)

According to Wennberg, some of the side effects may not be controlled by medical treatment, and finally, patients are forced to be as "death in life" (244). (Paper 14, two T-units, 15/11 words)

That is 12.3% of all pregnant women in Japan; compared to the world average of 15.76%, it is a slightly low rate ("Abortion Rate"). (Paper 27, two T-units, nine/15 words)

Gill Pratt, CEO of Toyota Research Institute, comments that for the acceptance of fully autonomous vehicles by society, it is going to take "considerable time" because there would be unavoidable crashes, injuries and fatalities by the fully autonomous cars (Lynley). (Paper 18, one T-unit, 40 words)

A study claim "capital punishment has a greater deter effect on the homicide rate compared with long-term imprisonment" (Radelet and Borg). (Paper 25, one T-unit, 18 words)

In the current situation, 91.1% of respondents said they would like to be left to nature and not be treated solely to prolong life behind the increase in life expectancy due to medical advances ("Heisei 25 nen"). (Paper 14, one T-unit, 37 words)

A similar amount of variation is found when referring to figures or tables included in the essay (a requirement).

Figure 1 describes annual executions in Texas, and the number of executions increased from around 1990 compared with the other two decades. (Paper 25, two T-units, six/15 words)

In practice, figure 1 shows the reason why people visit zoos. (Paper 2, one T-unit, 11 words)

Figure 1 and 2 indicate how intimately both political and religious factors affect public opinion towards abortion in the US ("Public Opinion"). (Paper 19, one T-unit, 22 words)

As seen in Figure 1, among the GM crops grown commercially, soybeans, grown at 92.1 MHA, followed by corn, cotton, and oilseed rape, are the most commonly grown crops ("What GM"). (Paper 5, one T-unit, 31 words)

Based on the above examples, it could be said that while the winter task may provide students with more opportunities to use longer structures than in the spring task, such constructions are not required for completion of the task. Therefore, it is possible that the task type may not be the main or only factor leading to longer average MLTU and that the students improved their ability to produce more complex sentences during the course of the study.

Discussion and Conclusion

Given that results from other longitudinal studies have not shown consistent, statistically significant increases in use of academic vocabulary or changes in syntactic complexity in student writing, it is unlikely that this group is an outlier in both areas, and much of the difference between the language used in the spring and winter writing must be attributed to task type and prompt or topic, all of which are known to have an influence on writing (Crossley, 2020; Therova, 2022). The gap between the more straightforward spring task and the more challenging winter assignment is undoubtedly the factor which explains much of the difference between the writing in the samples, particularly in terms of vocabulary use. The MLTU results are perhaps less clearly related to the writing specifications, though the winter assignment also represents a more complex task presenting more opportunity for use of complex structures, such as when reporting data and quoting or paraphrasing sources.

However, the possibility of student development during the study period should not be overlooked entirely. One of the key differences between learners in this and previous studies is the amount and length of English study in general and EAP tuition in particular. Students in this cohort take a substantial amount of EAP classes (over eight hours per week) in parallel with their content courses in the approximately 25 weeks between the spring and winter written assignments, compared to a maximum of three hours a week over a 12-week course in previous studies. This increases their opportunity to improve their writing skills.

In terms of lexical development, the setting (a Liberal Arts program) may have an influence. There is a suggestion within the relevant literature that students studying specific disciplines may not be exposed to a diverse range of vocabulary (Ozturk, 2015). In contrast to this, it seems possible that students in a liberal arts college, with the attendant breadth of courses that such a program entails, would be more likely to encounter a greater range of lexical items. Previous research has suggested that a lack of explicit instruction in lexical development does not prevent student growth in that area (Mazgutova & Kormos, 2015); thus, the possibility of passive acquisition (or through outside class self-study) may be pertinent.

Regarding complexity, as suggested through examples, longer T-units are not absolutely needed for the more complex functions required in the winter task. It should also be noted that there is no incentive for writers to increase the syntactic complexity of their writing. There is a broad category of accuracy (10% of final essay grade), but no marks are given for complexity. Accordingly, an improvement in the complexity of student writing over the time of the study appears to be a possibility.

One final contributing factor may be the role of drafts and feedback. Previous research has established that students view a lack of feedback as impeding their ability to improve their writing (Knoch et al., 2014; Knoch et al., 2015; Storch & Hill, 2008), though those findings relate more to grammatical feedback from content (i.e., non EAP) instructors. Participants in this study took a 10-week course (English for Written Communication) on the features in academic writing, which should have provided them with opportunities to receive feedback on areas including nominalisation, use of subordination and theme-rheme, all of which may impact MLTU. Students in this study are also required to attend a certain number of tutorial sessions each semester, and most do so after receiving written feedback on the first draft of an assignment. Though language use and accuracy are not a main focus of the course, it is probable that major errors in grammar and word choice are remedied at this stage, leading to the more polished final drafts which formed the corpora in this study and thereby raising AWL use and MLTU.

It should, however, be noted that other aspects of student life in a bilingual university can also play a role in language development. Other influences could include the content courses taken, contact with exchange students and participation in exchange programs and extracurricular activities (Crosthwaite, 2016). As such, determining which factor may have had the greatest effect on any development of the writing skills of the students is beyond the scope of this study.

One other potential application of the data is its use for comparison with previous research findings concerning the two main measures of this study, AWL use and MLTU, with the caveat that comparing results across studies and participant groups is fraught with difficulty. Those studies assessed the writing of students with IELTS scores of between 5.5–7, a range which would include most students in the current investigation, who have an approximate IELTS score of 5–6.5 or equivalent. In terms of lexis, winter AWL use of 8.67% compares quite favourably to previous studies (which had rates of between 5%–9.3%, see Table 1), though the timed writing used in other studies again is a potential constraining factor. However, the use in the winter corpus, when compared to expert academic prose, is also impressive. In the creation of the AWL, it was found that in three disciplines, AWL coverage was approximately 9% in expert writing: Arts (9.3%), Law (9.4%) and Science (9.1%) (Coxhead, 2000). Consequently, for AWL items to account for 8.67% of the work of novice writers is notable.

In the winter corpus, mean MLTU was 18.76 words. With the exception of one study, which found length at just under 20 (see Table 2), rates in other research were between 14 and 17. Given that the participants in some of these studies were graduate or postgraduate students in English-medium universities in English-speaking countries, the rates found in the winter corpus are quite high, though again the impact of task and the time pressure of diagnostic or timed writing must be considered.

Taken together, the findings presented here raise the possibility that using diagnostic/timed writing, though clearly valid and reliable instruments that are well suited for measuring changes in student writing ability, may not fully measure their abilities. As student performance in university is based more on outside class writing than timed/standardised tests, further research into AWL use and MLTU in non-timed academic writing would be of use to educators and researchers alike.

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