

A Quantitative Approach to Increase Awareness of Grammatical Inaccuracies in L2 Academic Writing

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Abstract

Identifying and classifying grammatical errors is a common practice in providing grammar feedback of L2 academic writing. Through error identification, students can recognize patterns in their writing and more precisely edit their work. However, even after identifying and correcting these errors, students often repeat the same inaccuracies in subsequent writings. Thus, while error identification can lay the foundation for improving grammatical awareness in academic writing, it must be followed by additional analysis for the student to reap the full benefit of this practice. Categorizing the errors in error charts has been shown to be beneficial for L2 academic writers by allowing them to more easily observe and analyze larger trends in their writing. (Ferris, 2005). These charts also prompt the student to produce quantitative and statistical representations of their writing, adding new depth to their grammatical awareness and facilitating easier identification of strengths and weaknesses to prioritize learning targets. This paper presents a 5-step process for implementing error identification and error logs to create graphical and statistical representations of errors in written work.

1. Introduction

For university-level students engaging in L2 academic writing, producing grammatically accurate language is essential. Grammatical accuracy has a significant impact on the assessment of L2 student writing (Hinkel, 2002) and is often a leading factor in the failure of international students to meet university-level expectations (Zhu, 2004). Accordingly, accurate grammar in writing is

foundational to success in academia; however, improving grammatical accuracy in L2 academic writing is no easy task.

Among the techniques utilized to help students improve their grammar in second-language academic writing, identifying grammatical inaccuracies in student writing is common (Ferris, 2002; 2005; 2006). For adult learners, error identification is particularly effective as it explicitly informs the student of their inaccuracies, which can reduce fossilization of incorrect language use and help students target specific grammatical errors in their writing (Ferris, 2004; 2005; 2010). As such, students are able to more precisely edit their work and take a more active role in the process of revision and self-correction.

However, the ability to revise in the short-term does not indicate long-term acquisition of the feedback or improved language competency overall (Truscott, 1996; Truscott & Hsu, 2008). Even after receiving error identification feedback, students often repeat the same errors in subsequent writings, placing the onus on the instructor to identify the same error across multiple writings, and leaving the student frustrated and demotivated. Consequently, while error identification and correction can lay the foundation for improving grammar in L2 academic writing, it must be followed by additional analysis for this practice to have the maximum impact.

A valuable next step to increase engagement with error identification feedback is categorizing and logging the identified errors in charts. The effectiveness of error charts can be understood in terms of the *noticing hypothesis* (Schmidt, 1990; 1993; 1995; 2001), which emphasizes that only through active attention and participation can the input received be converted into increased linguistic competence. In completing error charts, students have additional opportunity to *notice* grammatical inaccuracies in their writing by quantifying a variety of metrics based on the feedback provided, such as calculating the frequency with which they make a particular error (Choi, 2013).

Problematically, the completion of error logs is often the final step in engaging with the grammar feedback provided. After the log has been finished, the process of writing, feedback, and logging begins anew. However, without further interaction and analysis, simply logging grammatical errors does not ensure increased linguistic competence or reduced grammatical errors (Choi, 2013). Thus, extending the error identification and logging process to include

additional analysis and reflection is crucial to deepen awareness of grammar inaccuracies in second language writing.

Notably, error charts contain multiple data points, which serve as a solid foundation for additional analysis and provide students even further opportunity to raise awareness of their language use. Data gleaned from different logs can be used to create graphical and statistical representations of written work. By tracking data points across multiple writings, students can better develop their grammatical awareness in a familiar language: math.

The student-produced charts and graphs can also inform reflective and analytical writing practice, prompting further engagement with error-identification feedback. These reflective responses elicit academic and field-specific language through tasks such as summarizing graphs, analyzing data trends, and evaluating successful and unsuccessful approaches.

By expanding the error-identification process to include error chart analysis and graphical representation of grammatical accuracy in writing, students can more easily and independently see trends in their writing, prioritize learning targets, and deepen awareness of grammatical inaccuracies in their writing. Moreover, employing a data-driven approach can increase motivation for students, a necessary component of successful language improvement especially in higher levels of language development (Kim, 2009).

This paper details a 5-step implementation process for Error Log Analysis, where the focus of error-identification and correction shifts from a teacher-centered model of giving feedback to a student-centered model grounded in statistical analysis and reflection.

2. 5-Step Error Log Implementation Process

2.1 Step 1: Student-Produced Writing

The Error Log Analysis process begins with student-produced writing. As noted by Sokolik (2003), one of the fundamentals of teaching writing is encouraging students to actively engage in writing practice. While analyzing others' writings can help to increase awareness of grammar and writing generally, evaluating self-produced writing is integral to having specific knowledge of one's language use.

Student writing can be modified according to the level and language needs of the students. For lower-level students, a 30 minute in-class writing on a TOEFL or IELTS writing prompt could be beneficial. For higher-level students, writing for less time on more sophisticated topics or in more advanced ways, such as summaries or responses, is helpful.

The writing can be completed as an in-class activity or as an at-home assignment. A significant advantage of in-class writing is insuring students are producing authentic language. Moreover, if the activity is time-restricted and monitored in class, students can calculate their writing fluency as an additional metric. Importantly, by beginning with student-produced writing, both the instructor and student have an opportunity to analyze original student writing to identify grammatical inaccuracies.

2.2 Step 2: Error Identification

Once the student has produced original writing, grammatical errors in the text can be identified. The types of identified errors can be scaled according to the language level of the student and to meet curricular goals. For lower-level students, the instructor could limit identified errors to only one or two major error types, such as subject-verb agreement or verb tense. To address the language needs of students with higher-level language competency, identifying multiple error types including those in more advanced writing, such as gerund-infinitive confusion or subordination, is valuable.

Identification can take a variety of forms, ranging from numbers, symbols, and codes, each correlating to particular errors. Using codes makes feedback neater and clearer, which has been shown to increase student engagement with the feedback itself (Hyland, 2003). Additionally, identifying errors using this approach is significantly less time consuming for the instructor than actively labeling, classifying and correcting each error occurring in student writing. A sample error-identification chart is shown in Figure 1.

Error Reference Chart		
Error #	Error Name	Example
1	Verb Tense	Yesterday, I go <i>went</i> to class. Tomorrow, I see <i>will see</i> my family.
2	Verb Form	I interested <i>am interested</i> in science. The world becomes <i>is becoming</i> smaller.
3	Word Form	She has a beauty <i>beautiful</i> voice. The movie is interested <i>is interesting</i> .
4	Subject-Verb Agreement	The student work <i>works</i> hard. There is <i>are</i> many people in New York.
5	Singular/Plural	A lot of student <i>students</i> study abroad. (a lot of + plural) She hopes to do researches <i>research</i> in graduate school. (<i>research</i> is non-count)

Fig. 1 – Error identification chart in which numbers correspond to specific grammatical errors

2.3 Step 3: Targeted Grammar Instruction

After identifying grammatical errors in student writing, targeted and explicit instruction regarding how to recognize and revise the grammatical inaccuracies needs to be provided. Students cannot be expected to correct an error they cannot detect, do not know exists, or do not understand how to revise.

This instruction can be adapted as needed, including meeting with students individually to address specific language needs or identifying errors common to a class as a whole and revising them as an in-class activity. Key to success in this stage is choosing level-appropriate errors to address. In providing explicit and targeted instruction focused on identifying and revising specific errors in writing, students can more easily and clearly monitor the language they are currently using and compare it to the language they *should* be producing.

2.4 Step 4: Single Error Chart Completion and Analysis

Once students develop awareness of the location and types of their grammatical inaccuracies and have received explicit and targeted instruction regarding how to address them, the focus of this practice shifts to student evaluation of their errors, beginning with the completion of their error log. Each error log is aligned with the errors identified in the student writing, and as in the error-identification step, the information in the logs can be modified according to curricular goals and student language level. These logs can be used to meas-

ure a variety of metrics in student writings; the log shown in Figure 2 below prompts students to calculate error frequency and overall error percentage.

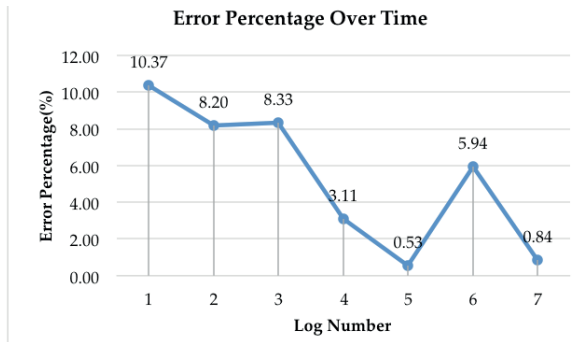


Fig. 2 – Error log measuring error frequency and overall error percentage

Using the data from the log, students can easily observe trends in their writing and independently prioritize language learning. An activity as simple as highlighting the most frequently occurring error types in a single log can help students recognize their weaknesses in grammar as well as set goals for future writings. (Fowler & Baker, 1974; Dzwickifli, 2013). Students can also calculate their overall error percentage –the percentage of their overall writing – that is not grammatically accurate. This can be calculated by dividing the total number of errors in the text by the total number of words. This data point can enable a student to measure their holistic grammatical accuracy in a single writing and monitor progress. Because the analysis is grounded in data, students can more aptly evaluate the state of their writing and take a more active role in setting learning targets.

Moreover, this data can support reflective writing practice and further reinforce language goals. Questions such as “according to your most recent error chart, what is your most common error and why do you think that is?” or “what do you need to focus on in future writings and how do you plan on doing this?” can be answered more readily by using data as the basis for analysis. In addition to providing students an opportunity to increase awareness of their grammar use in writing, these reflective questions elicit the language of data and quantitative analysis, a necessary component of academic writing.

2.5 Step 5: Multiple Error Chart Analysis and Reflection

Utilizing data from multiple writings and error logs, students can track their grammar usage and improvement over longer periods of time. Data collected from the logs can be used to create charts, graphs, and statistical models of grammatical accuracy and progress. These graphical representations allow the student to examine larger grammar patterns and trends.

The charts and graphs can then be used as a foundation for reflection and analysis, further reinforcing the impact of the error-identification feedback and increasing awareness of grammar usage in writing. The points of analysis below are only a very small sample of the different types of graphical analysis that can be performed with data from error charts.

2.5.1 Tracking Overall Error Percentage

Graphing overall error percentage across multiple writings, students can see a larger representation of their grammatical improvement and development. The data presents an empirical foundation for students to evaluate their progress and analyze their language use over time. These graphs can be generated consistently throughout the semester, or alternately, overall error percentage graphs can be developed at specific points, such as part of a midterm or final project. Utilizing the data from error charts to create graphs can be a novel experience for students who may have never seen their writing represented statistically. A sample is included in Figure 3 below.

Error Log			
#	Error	Frequency	Examples and Correction
1	Verb Tense		
2	Verb Form		
3	Word Choice		
4	Word Form		
5	Subject-Verb Agreement		
	Total # of Errors:		
	Total # of Words:		
	Error Percentage:		

Fig. 3 – Graphical representation of the error percentage of 7 writings over the course of a semester

Tracking the overall error percentage can also provide students with a concrete basis for reflective and analytical writing. Along with increasing opportunity to engage with and notice language, these reflections elicit academic language, including summary language, the language of quantification and statistical analysis as well as reported speech. Questions responding to this data could include “Do you see any trends? What are they?” or “What was the most meaningful data point? Why?”

Representing grammatical accuracy in statistical form and tracking that development over time can allow students to more easily visualize, analyze, and reflect on their writing progress. Additionally, engaging in reflective analysis can deepen the impact of the feedback and also reinforce additional language targets in written production.

2.5.2 Measuring Change in Error Percentage

In addition to tracking the overall error percentage across many writings, students can also develop awareness of their grammatical accuracy and progress over time by calculating their percent improvement. In contrast to tracking the overall error percentage for multiple writings, calculating the percent change of errors measures only the development between two writings. This measurement can be made between two subsequent writings or can be designed to measure change over longer periods of time, such as comparing the first and last writings in a semester.

The error percent change metric measures the actual numerical change in error percentage from the first writing to the last. This data point can be calculated by using the percent change formula, where the error percentage from the first writing is subtracted from that of the writing it is being compared with. This number is then divided by the error percentage of the first writing. The formula is shown below.

$$\text{Percent Change Formula} = \frac{\text{Final Error \%} - \text{First Error \%}}{\text{First Error \%}}$$

To see how this formula could be applied to student data from writing, we may consider a student whose error percentage from their first writing was 5%, and their error percentage from their last (most recent) writing was 1%. If the

student were to measure his or her percent change improvement between these two writings, the student could calculate the following:

$$\text{Percent Change} = \left| \frac{1\% - 5\%}{5\%} \right| = .8, \text{ or an } 80\% \text{ decline in the error rate.}$$

This data gives a particularly unequivocal assessment that can be useful in helping a student determine the impact of his or her grammatical improvement over a particular period of time.

Questions for reflection and employing the language of quantitative analysis could include “what does the data show about your grammar progress in writing?” or “what are the causes of the increase or decrease? Why was there a change?” In using data as the basis for reflection, students can more easily identify trends and more effectively analyze their grammar progress in writing.

2.5.3 Specific Error Frequency Chart

Tracking error frequency across writings can enable students to increase awareness of their use of a specific grammar element. While graphing the error percentage of multiple writings over time or calculating percent change of errors between two writings is helpful for observing larger patterns and trends in writing over time, quantifying and tracking common grammar errors allows for the further measure of progress in one’s writing development. In observing the frequency of specific errors over time, a student is able to more deeply and easily assess what techniques have been effective or ineffective in addressing weaknesses in grammar.

A sample frequency chart is shown in Figure 4.

Error Frequency Chart							
Error Type	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	Total
Articles	1	0	3	2	0	0	6
Singular or Plural	0	3	1	0	0	0	4
General Punctuation	1	0	2	0	1	0	4
Subject-Verb Agreement	0	1	1	1	0	0	3
Coordination	1	0	0	0	1	0	2

Fig. 4 – Sample frequency chart tracking the 5 most common grammar errors in student writing over the course of 6 writings.

Calculating error frequency of specific errors over multiple writings, students can use the data to independently identify patterns in their grammar use and more readily prioritize language targets for future writings. As opposed to having an instructor highlight grammar strengths and weaknesses for the student, charting error frequency can help students independently assess the accuracy of their grammar and evaluate their writing. By completing error frequency charts, students are given an additional opportunity to develop awareness of their grammar in writing and achieve the autonomy both student and teacher desire.

Questions for reflection can include “what was your most common error and why do you think that is?” or “how influential was your most common error among your other grammar errors?” Additionally, reflective questions could help raise awareness of effective learning processes in addressing grammatical errors. For example, questions such as “if there was an increase or decrease in a specific error, explain why. What caused the change? What did you learn that enabled you to make this improvement?” can help a student to determine what practices were most helpful in developing awareness of accurate grammar in academic writing.

2.5.4 Field-Specific Calculations

In engaging with statistical models of grammar, the analysis that can be produced is limitless. To address the specific linguistic needs for L2 academic writers, data can also be analyzed using field-specific formats and terminology. This could include creating the half-life of error percentage of writings for a student researching Carbon-14 dating (see Figure 5), or producing a full regression analysis for a student in the business field.

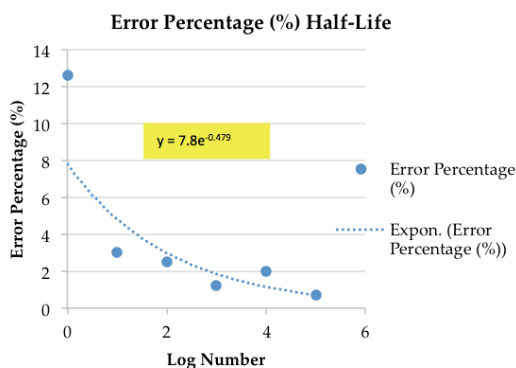


Fig. 5 – The above graph shows the calculation of error percentage half-life over the course of 7 writings.

In creating field-specific representations of grammatical accuracy, questions for reflection can employ field-specific terminology, giving the student a unique opportunity to analyze their writing in academically relevant and meaningful language. Reflective questions can include “overall, what does the graph show and what are the implications of the data?” or “How can you use this data to interpret changes, trends, or improvements in your writing?” Encouraging field-specific grammar analysis can have significant impacts on student buy-in and motivation in approaching their grammar development in writing as it puts their progress in terms that are academically relevant and meaningful for the student.

3. Conclusion

Extending the error-identification process to include error chart completion, analysis, and reflective writing practice lays the foundation for a dynamic and comprehensive approach to increasing awareness of grammatical accuracy in L2 academic writing. Moving away from the traditional, instructor-centered model for error-correction, the process presented herein is firmly grounded in using error correction as only a first step in a larger process of raising awareness of grammatical inaccuracies in L2 academic writing.

Engaging in a data-driven process provides a concrete basis for student evaluation and reflection of grammatical inaccuracies in writing. By developing statistical representations of written work, students can more efficiently and independently identify trends, progress, strengths, and weaknesses in their writing. Additionally, due to the heavy reliance on data analysis and statistical evaluation of L2 grammar in writing, this approach is especially beneficial for students whose academic or professional interests are rooted in research language and statistical analysis, such as those studying business and STEM fields or any student engaging in quantitative or graduate-level research. Ultimately, using data as a foundation for analysis of and reflection on writing, students can more effectively analyze their grammar usage and improve the quality of their writing overall.

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