Predicting Students' Final Scores in An Advanced Grammar Course using Multiple Linear Regression

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ABSTRACT

Continuous assessments encourage sustained learning that contributes to deeper knowledge retention and academic success. Investigating continuous assessments, such as quizzes and tests, is important in predicting final scores because they provide a reliable measure of students' learning progress across the semester. The present study examined the extent to which quiz scores, and test scores were able to predict final scores in a grammar course using multiple linear regression analysis. Data were collected from 223 first-semester students enrolled in the course. Preliminary analyses confirmed that the assumptions of multiple linear regression were met by looking at linearity, normality, reliability of measurement and homoscedasticity. The results revealed that quiz scores and test scores were positively associated with final scores, indicating that students who performed well in formative and summative assessments were more likely to achieve higher final scores. The results also showed that both quiz scores and test scores significantly predicted final scores with a substantial proportion of variance in students' final achievement. A regression model was developed using the SPSS software and the formulated model provides useful insights for educators in identifying early indicators of students' final performance and in designing instructional strategies that support academic achievement, ultimately enhancing the overall quality of instruction.

Keywords: (advanced grammar, continuous assessment, formative assessment, summative assessment, multiple linear regression)

INTRODUCTION

The importance of having a good grasp of the English language in particular amongst English language majors in the university is increasing as institutions participate in the race to achieving global ranking. Central to this is the role played by grammar in English Language Studies where Advanced Grammar is a compulsory subject. Advanced grammar courses are often challenging for students, requiring consistent reinforcement and practice. Quizzes, tests and oral presentations in these courses are designed to help learners master the various grammar components as well as track their understanding and application of complex grammatical structures. As such, exploring the relationship between the formative assessments and summative assessments is crucial for identifying students at risk of failing and to consolidate pedagogical practices. Multiple linear regression allows researchers to evaluate the combined effect of multiple independent variables, offering a more accurate predictive framework between formative assessments which act as predictors and the outcome which is summative assessments. Prior studies have highlighted the usefulness of such models in mathematics (Darman et al., 2019), in overall first year performance (Dagdagui, 2022), and language education forecasting achievement (Khiang & Cho, 2019). However, relatively few studies have examined advanced grammar courses specifically, despite their significance in language proficiency development. This study aims to address that gap by investigating the predictability of grammar quizzes and test scores on the final exam among first semester English language major undergraduates enrolled in Advanced Grammar course at UiTM. Specifically, it aims to (i) develop a multiple regression model to predict final scores and (ii) compare predicted outcomes with actual results. Findings from this research provide evidence for the effectiveness of continuous assessment as a reliable

predictor of academic achievement.

The objectives of the study are:

1. to develop a multiple regression model in predicting the students' final grammar scores based on their performance on continuous assessments which are the quiz and test.
2. to compare the actual final grammar scores and the predicted ones based on the developed regression model.

LITERATURE REVIEW

The Role of Assessment in Language Education Proficiency in English grammar is a cornerstone of success for English language majors, particularly in the context of competitive global higher education (Kasim & Sukarno, 2024). Within this domain, advanced grammar courses are often challenging, requiring consistent practice and robust assessment mechanisms to track mastery of complex structures. Assessment, therefore, is not merely an endpoint but an integral part of the learning process. It serves to diagnose understanding, provide feedback, and ultimately, certify competence. As noted by Rodríguez Rincón, Munárriz and Magreñán Ruiz (2024), continuous assessment is valued for its ability to motivate students and provide an objective basis for final evaluation, making it a critical tool in language education.

Formative and Summative Assessment: Purposes and Interrelationships

Educational assessment is broadly categorized into formative and summative types. Formative assessments, such as quizzes, are low-stakes evaluations designed to provide ongoing feedback to students and instructors during the learning process. Their primary purpose is to reinforce learning and identify areas needing improvement (Hanna & Dettmer, 2004). In contrast, summative assessments, like final exams or major tests, aim to evaluate student learning at the end of an instructional unit by comparing it against a standard or benchmark. The relationship between these two is crucial; formative assessments are theorized to build the foundational knowledge and skills that are ultimately measured through summative assessments. Effective learning environments strategically use formative tasks to prepare students for summative success.

The Predictive Validity of Continuous Assessment on Academic Achievement

A growing body of research supports the notion that performance on continuous, formative assessments can significantly predict final academic outcomes. For instance, Dagdagui (2022) used multiple linear regression to demonstrate that high school performance and admission test scores could predict 67.3% of the variance in first-year university students' grades. This finding is reinforced in a specific subject context by Darman et al. (2019), who successfully predicted students' final grades in a mathematics module using scores from continuous assessments. Most directly relevant to the current study, Madsen (2020) investigated a university-level grammar course and found that results from continuous exercises were a strong predictor of final exam results using linear regression. These studies collectively affirm that formative assessment performance is a reliable early indicator of summative achievement.

Multiple Linear Regression in Educational Forecasting

The methodological approach of using Multiple Linear Regression (MLR) is well-established in educational research for forecasting student performance. MLR is a powerful statistical technique that allows researchers to evaluate the combined effect of several independent variables (e.g., quiz scores, test scores) on a dependent variable (e.g., final exam score) (Uyanık & Güler, 2013). Its application extends beyond education to fields like biological assays, underscoring its robustness for quantitative prediction (Jarantow et al., 2023). When applying MLR, it is critical to test its key assumptions, including linearity and the absence of multicollinearity—a condition where predictor variables are too highly correlated, which can be detected using statistical measures like the Variance Inflation Factor (VIF) (Shrestha, 2020). Studies by Khaing and Cho (2019) have effectively utilized MLR in educational contexts, validating it as a suitable method for this study.

Gaps in the Literature: The Specific Case of Advanced Grammar Courses

Despite the established predictive validity of continuous assessments and the proven utility of MLR, a specific gap remains concerning advanced grammar courses in English language programs. While studies like Madsen's (2020) exist, they are relatively scarce compared to research in mathematics (Darman et al., 2019) or on general academic performance (Dagdagui, 2022). Furthermore, many studies in language education focus on affective factors like anxiety and its correlation with skills such as speaking (Kasim & Sukarno, 2024; Nety & Purnomo, 2023), rather than on the predictive power of objective assessment data within a grammar curriculum. Therefore, this study aims to address this gap by developing and validating a multiple linear regression model specifically to predict final scores in an Advanced Grammar course based on continuous assessment marks, thereby contributing a data-driven perspective to this critical area of language proficiency development.

METHOD

This study employs multiple linear regression analysis to see the relationships between the quiz and test (independent variables) and the final grammar scores (dependent variable) obtained from 223 students who enrolled in an advanced English grammar course. In addition, the analysis also shows the variation of the independent variables accounted for in the dependent variables (final grammar scores) and also produces predictive models (Uyanik & Güler, 2013). The predictive model for this study is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2$$

where

X_1: Quiz scores

X_2: Test scores

and β's denote the regression coefficients.

To ensure the assumptions of multilinear regression analysis are met, linearity, normality, reliability of measurement, and homoscedasticity are analysed before multilinear regression analysis is performed.

RESULTS AND DISCUSSION

Linearity

Multiple regression can effectively estimate the relationship between the independent variable(s) and the dependent variable, provided that their association is linear. Test of linearity was used in determining the linearity between these variables. Table 1 and Table 2 below show that the linearity exists between each variable (quiz and test) and the dependent variable (the final grammar scores).

Table 1 Linearity test (Final grammar scores* Quiz)

		Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)	12437.8	39	318.91	13.5	.001
	Linearity	11325.2	1	11325.2	480.6	.001
	Deviation from Linearity	1112.56	38	29.278	1.243	.175
Within Groups		4312.09	183	23.563		
Total		16749.9	222			

Table 2 Linearity test (Final grammar scores* Test)

		Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)	12343.	42	293.890	12.00	.001
	Linearity	10917.	1	10917.4	445.9	.001
	Deviation from Linearity	1425.8	41	34.778	1.421	.063
Within Groups		4406.5	180	24.48		
Total		16749.9	222			

Table 1 and Table 2 show that the p values for deviation from linearity for quiz is .175 and for test is 0.063 respectively which are above 0.05. The insignificant results indicate that there is a clear linear relationship between the independent variables, quiz and test, and the dependent variable, final grammar scores. According to Kasim and Sukarno (2024) and Nety and Purnomo (2023), a linear relationship between variables is determined when the divergence from linearity exceeds a value of 0.05.

Normality

The regression model assumes that the variables follow a normal distribution. Non-normal distributions may misrepresent relationships and affect the accuracy of significance testing. To assess normality, the Kolmogorov-Smirnov and Shapiro-Wilk tests were conducted, as shown in Table 3 below. The results indicate significance values of 0.087, 0.200 and 0.200 (all p values are > 0.05) for the Kolmogorov-Smirnov test and 0.429, 0.907 and 0.193 (all p values are > 0.05) for the Shapiro-Wilk test, suggesting that all variables under investigation are normally distributed. These findings are further supported by the Q-Q plot for quiz, test and final grammar scores (see Figure 1, Figure 2 and Figure 3), where the data points align closely with the diagonal line, reinforcing the assumption of normality. Darman et al. (2023) and Kasim and Sukarno (2024) stated that a normality test with the p-value more that 0.05 signifies the normal data distribution.

Table 3 Tests of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
QUIZ	.056	223	.087	.993	223	.429
TEST	.032	223	.200*	.997	223	.907
FINAL GRAMMAR SCORES	.046	223	.200*	.991	223	.193

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

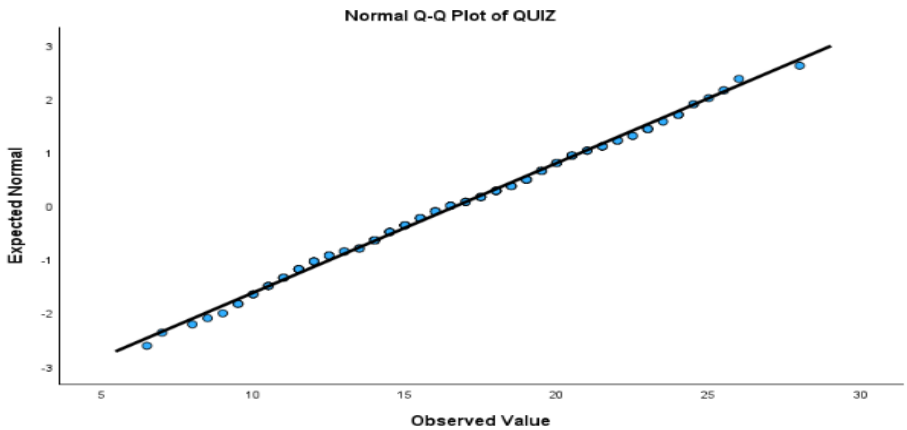

Figure 1 Q-Q plot for quiz

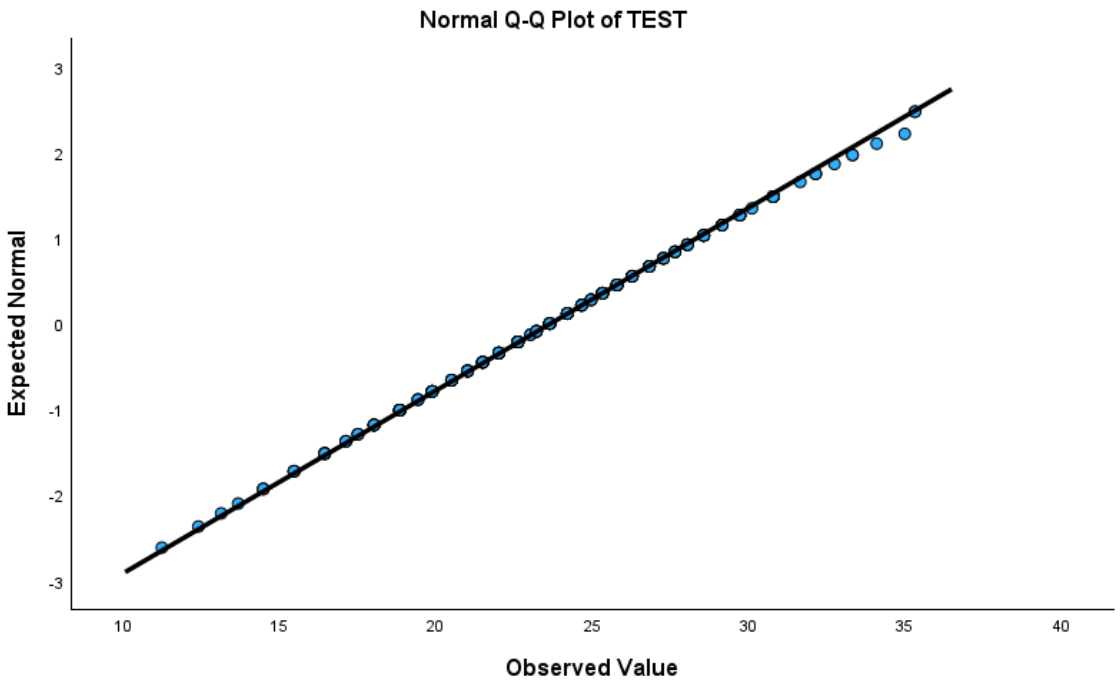

Figure 2 Q-Q plot for test

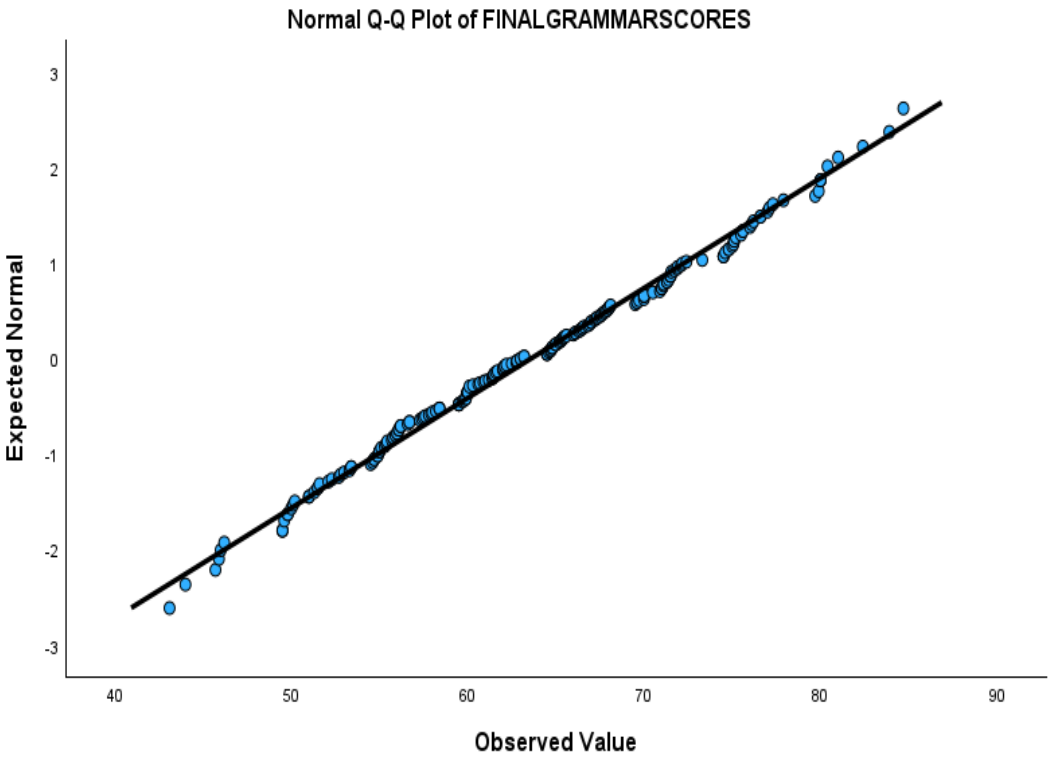

Figure 3 Q-Q plot for final grammar scores

Reliability of measurements

Multiple linear regression assumes the absence of multicollinearity among the independent variables. Multicollinearity arises when the predictors are highly correlated with one another (Darman et al., 2019). This assumption can be assessed using Pearson's bivariate correlation. As shown in Table 4 below, the correlation between quia and test is 0.416, which is below the threshold of 0.80. According to Shrestha (2020), if the absolute value of the Pearson's correlation coefficient is well below 0.80, collinearity is unlikely to exist. Thus, the analysis confirms that the assumption of measurement reliability is met.

Table 4 Correlation			
		QUIZ	TEST
QUIZ	Pearson Correlation	1	.416**
	Sig. (2-tailed)		<.001
	N	223	223
**. Correlation is significant at the 0.01 level (2-tailed).			

Homoscedasticity

A scatter plot provides an effective method for assessing homoscedasticity. It allows researchers to examine whether the residuals are evenly distributed across the regression line (Jarantow, et al., 2023). Figure 4 below shows that most of the data are in the range of 2 and -2 which suggests that the assumption of homoscedasticity is met (Darman et al., 2019).

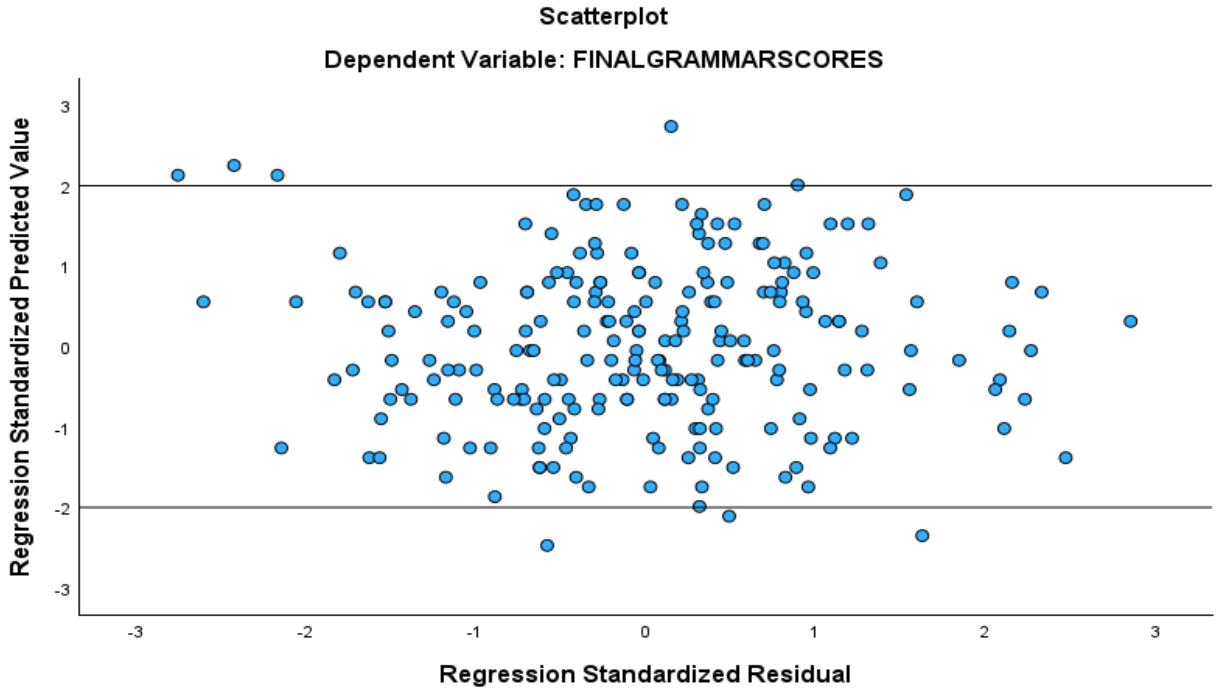

Figure 4 Homoscedasticity scatterplot

The findings above show that the four assumptions of multiple regression are fulfilled, thus, the independent and dependent variables are appropriate for regression model development.

Regression model development

Table 5: Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	0.868	0.753	0.752	2.17615	
a. Predictors: (Constant), TEST, QUIZ					
b. Dependent Variable: FINALGRAMMARSCORES					

Table 6: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	15708.06	2	7854.03	1658.4	0.001
Residual	1041.842	220	4.736		
Total	16749.91	222			

a. Dependent Variable: FINALGRAMMARSCORES

b. Predictors: (Constant), TEST, QUIZ

Table 7: Coefficients

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	18.298	0.814		22.49	0.001
QUIZ	1.237	0.039	0.588	31.8	0.001
TEST	1.042	0.034	0.563	30.42	0.001

a. Dependent Variable: FINALGRAMMARSCORES

Table 5 reveals that the multiple correlation coefficient (R) is 0.868, indicating a strong positive relationship between the independent variables (Quiz and Test) and the dependent variable (Final Grammar Scores). The coefficient of determination (R^2) is 0.753, which means that 75.3% of the variance in the final grammar scores can be explained by quiz and test, while the remaining 24.7% is attributable to other factors not included in the model. These results suggest that the independent variables have strong predictive power for students' final grammar scores.

The ANOVA results presented in Table 6 show a p-value of 0.001, which is below the 0.05 threshold, which confirms that students' grammar performance is significantly influenced by their performance in quiz and test scores. Based on the analysis in Table 6, the multiple linear regression model can be expressed as:

Predicted Final Grammar Scores=18.298 + 1.237(Quiz) + 1.042 (Test)

Thus, it can be concluded that quiz and test can significantly predict students' final grammar scores, with regression coefficients of 1.237 and 1.042, respectively.

Using multiple linear regression in developing regression model to predict the outcomes has been conducted in many studies, eg. Dagdagui (2022) and Khiang and Cho (2019) in predicting the students' academic performance, Darman et al. (2019) in predicting Math scores, and Oflaz (2019) in predicting speaking skills. Therefore, this technique is deemed applicable to be employed in predicting the final grammar scores of the students.

Comparing observed and predicted final grammar scores

Table 7 compares the predicted and observed final grammar scores for 15 selected students. The relatively small differences (below 2 marks) the predicted and actual scores suggest that the regression model provides

an adequate fit and is appropriate for use. The results of this study are in line with Darman et al.'s (2019) and Khiang and Cho (2019), however, the differences between the observed and predicted scores in 3 marks and 4 marks respectively. In conclusion, the regression model provides a good fit, with differences below 2 marks indicating stronger accuracy and better predictive performance compared to the larger variations of 3 to 4 marks reported in previous studies. This suggests that the model used in this study offers a more precise estimation of scores.

Table 7 Comparison between observed and predicted final grammar scores

Std	Quiz	Test	Obsrvd FG Scores	Prdctd FG Scores	Diff.
1	10.50	18.00	50.00	50.04	-0.16
2	12.00	23.00	56.00	57.15	-1.45
3	14.00	23.50	59.50	60.10	-0.60
4	22.50	27.50	75.00	74.78	0.22
5	23.00	30.50	80.00	78.53	1.47
6	21.50	21.00	65.00	66.78	-1.78
7	18.50	20.50	61.50	62.54	-1.04
8	17.00	23.00	65.00	63.29	1.71
9	16.50	22.50	63.00	63.10	0.10
10	19.00	30.50	74.50	73.50	1.00
11	11.50	11.50	44.00	44.23	0.23
12	24.50	35.00	85.00	85.08	0.08
13	12.00	25.50	60.50	59.75	0.75
14	17.00	25.00	66.00	65.38	0.62
15	23.00	29.00	77.00	76.97	0.03

CONCLUSION

Using multiple linear regression, this study examined the extent to which the results of formative assessments are able to predict students' performance in the summative assessment. The study found a strong relationship between the two assessment types explaining 75.3% of the variance. The close alignment between actual and predicted scores, with differences generally below two marks, highlights the reliability of the regression model as a practical tool for forecasting academic outcomes. These findings are consistent with those outlined in literature, it also emphasises the importance of continuous assessment not only as a means of tracking student progress but also as a reliable indicator of their achievement in the summative assessment. This model is indeed a valuable framework that helps to identify underperformers, it enables educators to undertake remedial steps with a degree of confidence. For curriculum developers, the study underscores the need to design meaningful quizzes and tests that both facilitate learning and provide predictive insights into student performance. Beyond classroom practice, the research contributes to the wider field of educational analytics by demonstrating the applicability of regression models in language learning contexts. While literature exists on similar studies carried out in subjects such as mathematics and general academic performance, this study adds evidence from the subject of Advanced Grammar, a critical but less-explored domain in English language education. In conclusion, this study shows that multiple regression is an effective method for predicting grammar achievement, confirming the strong predictive value of continuous assessments and supporting data-driven, student-centred teaching practices. The study while acknowledging its limitations in scope, proposes that similar studies in the subject of English Language courses particularly in the area of Grammar to enhance the generalisability of the findings. Future research could incorporate additional independent variables such as

gender, entry-level proficiency, and socio-economic background which will provide a more comprehensive understanding of the factors influencing learning outcomes.

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You can dedicate this section to give recognition and acknowledgement to those involved in your project

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