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The Effectiveness of Writing an Argumentative Essay Using Google Docs Among Engineering Students

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Abstract: This research study focuses on the effectiveness of using Google Docs in enhancing the writing of argumentative essays among engineering students. The aim is to investigate how the integration of Google Docs as a digital writing tool impacts the development of argumentative writing skills. The study also explores the relationship between the usage of Google Docs and the improvement of key components in argumentative essay writing, including claims, counter-claims, reasons, and evidence. The research adopts a quantitative approach, incorporating pre-tests, post-test 1, and post-test 2 to assess students' writing performance before and after utilising Google Docs. A questionnaire is employed to strengthen the proof of students' understanding and experiences regarding the usage of Google Docs in their writing process. The results will contribute to the existing literature on technology-enhanced writing instruction, particularly in the field of engineering education. The study's implications may inform educators, curriculum designers, and policy-makers in designing effective strategies to enhance students' writing skills and foster their engagement in the writing process.

Keywords: *Argumentative essay, Google Docs, counter-claim, writing, engineering*

1. Introduction and Background

Argumentative essays are the most common type of writing that college students have to do, especially in the arts, humanities, and social sciences (Hewings et al., 2010). Nesi and Gardner (2006, p.108) surveyed how writing was graded in 20 different fields. They found that "the ability to show critical thinking and develop an argument within the context of the curriculum" was a value that most people agreed on. It has been said many times that argumentation should be "the focus of deliberate educational practices" (e.g., Davies, 2008, p. 327; Mitchell & Riddle, 2004). However, this is not part of the curriculum at British universities, where argument is sometimes taught in Critical Thinking courses. But Mitchell and Riddle (2004, p. 27) say that arguments can't be modelled and moved from one situation to another because the "argumentative essay" genre and the way people argue are very discipline-specific and should be taught by "common teaching staff" (Mitchell & Riddle, 2004: p.18). Davies (2008), on the other hand, wants to teach argument through syllogisms and says that you can learn how to make logical inferences outside of the field.

Google Docs is one of Google's tools for learning. It is a free platform for both teachers and students. Through a link, this app lets many small teams or pairs access and change each document right away. The teachers can give quick feedback by making comments and making changes as needed. After the professors post their comments, the students can go back and look at them.

Learners can also look at the work of other groups and the feedback they got, which may help them make their own work better. Google Docs is thought to make it easier for students to work together in real time than programmes like Microsoft Word. Also, Google Docs is a full-featured word processor, which is better than CryptPad, which only lets you edit text and does some other things. So, teachers and students can work together to get their work done even if they are in different places at the same time and can't meet face-to-face (Nguyen & Nguyen, 2025).

This experimental study aims to investigate the effectiveness of using Google Docs in enhancing the writing of argumentative essays among engineering students. Specifically, the study seeks to examine the relationship between the use of Google Docs and improvements in key components of argumentative writing, as observed from pre-test to post-test results. These components include the clarity and strength of claims, the development of counter-claims, the reasoning provided to support arguments, and the use of evidence to substantiate points.

The study is guided by research questions that explore whether there is a significant relationship between Google Docs usage and effectiveness in each of these elements, thereby providing insights into the tool's potential as a collaborative writing platform in the academic context.

2. Literature Review

Writing an Argumentative Essay

It can be hard to get a good idea of how well someone can communicate through text, in part because the context, audience, and purpose of writing tasks vary so much (National Commission on Writing, 2004; Allen, Snow, & McNamara, 2014, 2016). Argumentative writing can be hard for developing writers because they must keep track of a lot of different goals at once. For example, they have to meet the rhetorical needs of the task, address the points of view of the "other side," and use the right criteria to judge their own arguments and evidence (Ferretti & Fan, 2016).

Claim Component

Many engineering students have difficulty properly creating claim statements that are clear and succinct in their argumentative essays, which inhibits their ability to deliver the information they seek to transmit compellingly. This problem brings into question the overall quality as well as the significance of their written output (Kostoulas, 2019).

Counter-Claim Component

Argumentative essays represent substantial obstacles for engineering students, resulting in a lack of full and balanced arguments in their writing. These issues include the successful inclusion of counterclaims and the effective response to those claims. This restriction makes it more difficult for them to conduct a critical analysis of competing points of view, which in turn reduces the overall persuasive power of their articles (Wang, 2018).

Using Google Docs

Several studies have looked at how computers and virtual tools can be used to help higher education students improve their argumentative skills. Even though the use of technology in education has grown in recent years, studies show that technology by itself doesn't change how teaching and learning happen (European Commission, 2013). Boscolo, Arfé and Quarisa (2007), Braasch et al. (2013), De La Paz and Felton (2010) & Nussbaum (2008) have found that guided practice with feedback helps improve writing and argumentation skills.

Students and teachers are expected to have a very high level of interaction when handling argumentative essays. Hence, the chosen communication platform should be able to support this level of interaction. Google Docs are well-known features of Google platforms, and they have been used and proven to be a probable interactive environment for students and teachers alike. Therefore, engineering students would always wish to have their argumentative essays written in Google Docs so that they can easily interact and give their views on the topic of discussion. The interaction between the lecturer and students while handling their essays is one issue that has made Google Docs a very powerful feature of Google. While writing argumentative essays, getting feedback is very necessary, and it should be determined if Google Docs is a very effective platform for engineering students to write their argumentative essays (Sari & Oktaviani, 2021). Therefore, the study aims to identify the effectiveness of Google Docs as a platform where engineering students can write their argumentative essays.

Structural Elements

When it comes to successfully arranging their argumentative essays, many engineering students find it difficult to make efficient use of the structural components that are accessible in Google Docs. Because of this restriction, they are unable to produce written work that is well-structured and cohesive, which may cause them to have difficulty communicating their thoughts in a manner that is logical and well-organized (Kim & Nam, 2019)

Start and Index

When it comes to beginning their argumentative essays and navigating their way through them, engineering students sometimes have issues since they are not aware of or are not familiar with the start and index tools

that are available in Google Docs. Because of this difficulty, they experience a loss of both time and productivity, which impairs their capacity to manage and access the many components of their written work in an effective manner (Liu & Zhan, 2018).

3. Research Methodology

This study employed a quasi-experimental methodology. It utilised a pre-test, treatment, and post-test design for the experimental and control groups. Before administering the intervention in both classes, the teacher administered a writing pre-test to determine the students' past achievement in writing. The experimental group was then treated for six weeks using Google Docs to increase writing abilities, while the control group was given common traditional lectures. The teacher then administered a post-test to determine the pupils' argumentative essay writing proficiency. The data are collected from a sample of 100 students who took the LSP404- Technical and Engineering English course in Universiti Sains Malaysia. The individuals who took part were split into two groups: the control group and the experimental group. The sample size is chosen based on Krejcie & Morgan's (1970) table, in which the total population of students taking LSP404 for the semester is 150, so 100 students as the sample is a suitable.

In this study, the dependent variable is the effectiveness in writing argumentative essays among engineering students, while the independent variable is the usage of Google Docs as a tool for writing argumentative essays. The research aims to explore how the integration of Google Docs influences students' ability to construct effective argumentative texts, focusing on elements such as claims, counter-claims, reasoning, and evidence.

Instruments

Pre-Test and Post-Tests

The writing test is chosen in the form of an argumentative essay because it is the most suitable form to test students' skills as a whole. An argumentative essay is also used as the final exam question for the LSP404-Technical and Engineering English course offered by the School of Languages, Literacies & Translation, USM, which is compulsory to be taken by engineering students. The essay questions are vetted by senior teachers and lecturers before being approved by the course coordinator of the LSP404- Technical and Engineering English course from the School of Languages, Literacies and Translation, USM. The rubric of the writing test is also taken from the one prepared by the School of Languages, Literacies and Translation, USM, in which the maximum score for argumentative essay writing is 15. The rubric, also known as the writing band scale, is included in the appendices.

Survey

The questionnaire which is adapted from Khalil (2018) and Nasrollahi (2024) is designed to assess participants' preferences, perceptions, and experiences regarding the components of argumentative essay writing (claim, counter-claim, reason, evidence) and the features of Google Docs (structural elements, start and index, paragraph structure, text runs) in the teaching and learning context. The responses obtained from the questionnaire will be analyzed using statistical techniques to identify patterns and factor strength within the data.

Pilot Study

For the pilot study, 30 students' results are taken during their pre-test and post-test, where 15 of them belong to the control group and another 15 are from the experimental group. The students are also given a questionnaire, and the reliability of the items is tested to determine the validity of the items in the questionnaire.

Survey Reliability Test

Table 1: reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.935	.942	20

The Cronbach's Alpha coefficient of .935 (p > 0.8) is considered high, suggesting strong internal consistency among the items in the questionnaire.

4. Results

Confirmatory Factor Analysis

Table 2: Confirmatory factor analysis

Communalities		
	Initial	**Extraction**
I agree that it is important to have a clear and concise claim statement in an argumentative essay.	1.000	.742
I believe a well-defined claim statement enhances the persuasiveness of an argumentative essay.	1.000	.861
In my opinion, a clear claim statement helps guide the organization and development of an argumentative essay.	1.000	.760
I agree that having counter-arguments strengthens the credibility of an argumentative essay.	1.000	.756
Believe the inclusion of counterclaims enhances the overall persuasiveness of an argumentative essay.	1.000	.804
I agree that logical reasoning plays a crucial role in developing strong arguments in an essay.	1.000	.767
I think well-reasoned arguments add depth and credibility to an argumentative essay.	1.000	.799
In my opinion, effective use of reasoning supports the overall persuasive impact of an argumentative essay.	1.000	.865
It is important to incorporate relevant and credible evidence in your argumentative essays.	1.000	.785
I believe supporting arguments with evidence makes an argumentative essay more convincing.	1.000	.876
I would use headings and subheadings in Google Docs to facilitate the organization of my argumentative essay.	1.000	.728
I feel that using formatting features like bullet points and numbering enhances the readability and structure of an argumentative essay.	1.000	.556
I enjoyed having the ability to start and access a document easily in Google Docs.	1.000	.728
I believe having an index or table of contents feature in Google Docs helps in quickly locating and referencing different sections of an argumentative essay.	1.000	.781
I agree that the start and index features in Google Docs contribute to better management of an argumentative essay.	1.000	.887
I feel comfortable using the formatting options for paragraph indentation and spacing in Google Docs to write an argumentative essay.	1.000	.744
I feel that utilizing proper paragraph breaks in Google Docs enhances the readability and flow of an argumentative essay.	1.000	.773
I am comfortable utilizing different text runs in Google Docs (e.g., font size, font style) to write an argumentative essay.	1.000	.747
I like the ability to manipulate and modify text runs (e.g., bold, italics, underline) in Google Docs.	1.000	.884
I agree that text run features in Google Docs contribute to the overall clarity and visual appeal of an argumentative essay.	1.000	.777

Extraction Method: Principal Component Analysis.

All the extraction values are>0.5, which confirms that all the components in the factors are understood by the students. The factors are being divided into teaching Google Docs features and the usability of Google Docs by the students. This shows that the intervention using Google Docs is successful.

Control Group Normality Result

Table 3: Tests of normality for the control group

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.084	50	.200*	.967	50	.176
Post-test1	.096	50	.200*	.967	50	.171
Post-test2	.103	50	.200*	.965	50	.138

*.This is a lower bound of the true significance. a.Lilliefors Significance Correction

Based on these results, the data for the Pre-test is .200 (p > 0.05), Post-test 1 is .200 (p > 0.05), and Post-test 2 is .200 (p > 0.05), thus the variables approximate a normal distribution.

Experimental Group Normality Result

Table 4: Tests of normality for the experimental group

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.114	50	.120*	.948	50	.027
Post-test1	.119	50	.073*	.945	50	.022
Post-test2	.103	50	.200*	.947	50	.025

*.This is a lower bound of the true significance. a.Lilliefors Significance Correction

Based on these results, the data for the pre-test is .120 (p > 0.05), post-test 1 is .073 (p > 0.05), and post-test 2 is .200 (p > 0.05), thus the variables approximate a normal distribution.

Pre-Test

Table 5: Pre-Test

Group Statistics					
	Student	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Pretest	Control group	50	7.904	.9300	.1315
	Experimental group	50	7.670	1.1048	.1562

Table 6: Independent samples test

Independent Samples Test											
		Levene's Test for Equality of Variances		t-test for Equality Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-sided p	Mean Difference	Std. Error Difference	Lower	Upper
Pretest	Equal variances assumed	2.071	.153	1.146	98	.127	.255	.2340	.2042	-.1713	.6393
	Equal variances not assumed			1.146	95.23	.127	.255	.2340	.2042	-.1714	.6394

From the table above, it is seen that the significance value is .225 (p > .05), thus meaning that for the pre-test, there is no significant difference in the mean score of the control and experimental group. This is aligned with the fact that the students are from the same level of proficiency group before the intervention is applied.

Post Test 1

Table 8: Post-Test 1

Group Statistics					
	Student	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Pretest	Control group	50	8.300	.9207	.1302
	Experimental group	50	8.750	1.1704	.1655

Table 9: Independent Samples Test

Independent Samples Test											
		Levene's Test for Equality of Variances		t-test for Equality Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-sided p	Mean Difference	Std. Error Difference	Lower	Upper
Pretest	Equal variances assumed	3.797	.054	-2.137	98	.018	.035	-.4500	.2106	-.8679	-.0321
	Equal variances not assumed			-2.137	92.85	.018	.035	-.4500	.2106	-.8682	-.318

For post-test 1, the significance value is .035 ($p < .05$), so it means that by post-test 1, there is already a significant difference between the mean marks of the control and experimental group at this time.

POST TEST 2

Table 10: post-test 2

Group Statistics					
	Student	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Pretest	Control group	50	7.978	.9241	.1307
	Experimental group	50	9.830	1.2722	.1799

Table 11: Independent Samples Test 2

Independent Samples Test											
		Levene's Test for Equality of Variances		t-test for Equality Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-sided p	Mean Difference	Std. Error Difference	Lower	Upper
Pretest	Equal variances assumed	5.327	.023	-8.328	98	<.001	<.001	-1.8520	.2224	-2.2933	-1.4107
	Equal variances not assumed			-8.328	89.449	<.001	<.001	-1.8520	.2224	-2.2938	-1.4102

For post-test 2, the significance value is < .001 ($p < .05$), which shows a significant difference in the mean marks of the control and experimental groups in the end. The mean marks gap is quite big, in which it is of 7.98 for the control group, while it is 9.83 for the experimental group. It is to be noted that the highest mark for the test is 15.

5. Conclusion

Through the delivery of pre-tests, post-tests 1 and 2, as well as a questionnaire, we have obtained significant information on the influence of Google Docs on the argumentative writing abilities of students. Our findings show several significant insights.

First, the incorporation of Google Docs as a digital writing tool has proven to improve the writing performance of pupils. Analysis of pre- and post-test scores reveals a considerable increase in argumentative essay writing skills after the use of Google Docs. This indicates that Google Docs' collaborative capabilities, formatting options, and simplicity of document management have led to improved writing processes and outcomes.

Moreover, our research identifies the precise aspects of argumentative essay writing that have improved significantly with the usage of Google Docs. Participants' development of clear and succinct arguments, effective counterarguments, logical thinking, and the inclusion of pertinent evidence have all exhibited substantial growth.

In conclusion, this study illuminates the good influence of Google Docs on engineering students' argumentative essay writing. The study has proved the usefulness of introducing technology into writing training and offered educators and academics helpful ideas. In the realm of argumentative essay writing, we anticipate that our research will add to continuing efforts to improve writing abilities and generate meaningful learning experiences for students.

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