

*Empirical Research Article***Exploring EAP Students' Perceptions Toward Using Google Apps for Multimodal Collaborative Writing**

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<https://doi.org/10.58304/tc.20251101>**Abstract**

Notwithstanding that much research has been conducted to showcase how Google Apps can impact the collaborative writing progress, how Google Apps can facilitate the L2 writing of EAP (English for Academic Purposes) students viewed through the lens of sociocultural theory and cognitive theory of multimedia learning is underexplored. This study addresses this gap by utilizing a modified survey to reveal EAP students' learning experiences regarding the development of their academic writing via Google Apps at a language center embedded in a university. Results show that although little to no positive relationship was observed between students' writing performance and their perceptions of employing Google Apps for collaborative writing, the Advanced Writing class yielded a statistically significant difference compared to the Academic Writing class in the Motivation subscale. Also, students from East Asia demonstrated more willingness to work collectively on assigned writing projects than their peers from Arabic countries. The results suggest that Google Apps may better empower EAP students to improve their academic writing if the classes are more project-based and subject-area related. Among the implications are that essential facets such as class type, students' linguistic and cultural background, and prior experience with and knowledge of Google Apps should be pedagogically attended to.

Keywords

English for academic purposes, sociocultural theory, computer-assisted language learning, multimodal collaborative writing, Google Apps

Introduction

Academic writing is widely regarded as an essential skill for English learners (ELs) preparing to transition into U.S. higher education, as it indicates readiness to meet academic demands. However, many international students experience anxiety and hesitation when faced with such tasks due to the complex rhetorical conventions and cognitive demands of academic writing (Fadda, 2012; Singh, 2016). As educational technology continues to reshape L2 learning, tools like Google Apps have emerged as effective platforms for supporting collaborative academic

writing. Research suggests that features in Google Docs—such as real-time editing, commenting, and revision history—enhance L2 learners’ writing development by lowering cognitive load and fostering digital literacy (Bikowski & Vithanage, 2016; Ebadi & Rahimi, 2017; Mayer & Moreno, 2003; Suwantarathip & Wichadee, 2014). Yet, ELs in teacher-centered or tech-restricted educational contexts often lack prior exposure to such tools. This study investigates how an EAP instructor, drawing on sociocultural theory and dialogic scaffolding, introduced Google Apps in Academic Writing and Advanced Business courses to support collaborative writing and facilitate learners’ progression toward independent academic writing. Using a modified questionnaire (Liontas, 1999), the study explores ELs’ experiences with digital collaboration and writing in technology-mediated environments.

Theoretical Frameworks

Sociocultural Theory

Grounded in sociocultural theory (Vygotsky, 1978), this study views L2 writing as a socially mediated, dynamic, and iterative process shaped by peer interaction, symbolic tools, and culturally situated practices. Common approaches to writing in a second language involve multiple stages—brainstorming, drafting, revising—anchored by the reviewing phase, during which learners internalize feedback and reflect on their output. This recursive loop aligns with Ericsson and Pool’s (2016) “3F” model of deliberate practice: Focus, Feedback, and Fix-it. Vygotsky’s concept of the Zone of Proximal Development (ZPD) further emphasizes that with appropriate scaffolding from more capable peers or instructors, learners can reach higher cognitive and linguistic levels. Language, especially through speaking and writing, plays a central role in cognitive development, supporting functions like voluntary attention, planning, and rational thought (Aljaafreh & Lantolf, 1994). Collaborative writing, therefore, enables learners to negotiate meaning, co-construct knowledge, and develop coherence and logic in their texts (Donato, 1994; Swain & Lapkin, 1998). While Piagetian perspectives highlight peer interaction for breaking egocentrism (Wadsworth, 1978), Vygotskian theory underscores linguistic mediation as pivotal for learning, making sociocultural theory a robust framework for analyzing L2 learners’ writing development in technology-supported environments.

Literature Review

Collaborative L2 writing

Collaborative L2 writing, defined as the joint production of a text by two or more writers (Storch, 2011), fosters collective efficacy (Bandura, 2000) and offers learners scaffolded opportunities to co-construct knowledge and negotiate meaning (Donato, 1994; Swain, 1995). Through peer interaction and shared decision-making, L2 learners can enhance idea selection, organization, and revision processes (Strobl, 2014; Watanabe & Swain, 2007). With the rise of digital tools, learners—especially digital natives (Prensky, 2001)—increasingly engage in collaborative writing via platforms like Google Apps, Slack, and Dropbox. In regards to Google Docs, Storch (2021) underscores that Google Docs promotes L2 collaborative writing by facilitating real-time co-construction of texts, thereby improving target language proficiency via interactive dialogue, peer negotiation, and shared authorship. Studies have shown that Google Docs, in particular, enables L2 learners to write recursively, exchange synchronous and asynchronous feedback, and develop higher writing efficacy (Abrams, 2016, 2019; Alsahil, 2024; Bikowski & Vithanage, 2016; Zhang et al., 2025). However, successful collaboration hinges on task framing, explicit role design, and shared communication goals—and these elements should be intentionally engineered into both the activity and its assessment when implementing digital writing tools (Alsahil, 2024; Chen & Zhang, 2024; Cho, 2017; Zhang et al., 2025)."

Empirical studies support the effectiveness of Google Docs in enhancing collaborative L2 writing across diverse contexts. Kessler et al. (2012) found that Fulbright scholars from varied backgrounds wrote fluidly and meaningfully on Google Docs, prioritizing content over form while actively supporting each other. Similarly, Abrams (2016, 2019) noted that beginner-level learners focused on meaning-making rather than structure, with higher engagement correlating with richer content and coherence. Bikowski and Vithanage (2016) reported that both individual and group writers benefited from teacher feedback on Google Docs, developing metacognitive and structural awareness through indirect guidance. Shintani and Aubrey (2016) highlighted the effectiveness of synchronous and asynchronous corrective feedback via Google Docs in improving grammar accuracy. However, Wu (2015) offered a cautionary perspective, finding that learners in a blog-mediated collaborative writing class showed increased anxiety and less satisfaction, underscoring the need for targeted training and instructor support when integrating computer-mediated communication (CMC) tools into L2 writing instruction.

In addition, recent work converges on one direction: experimental evidence shows that Google-mediated collaboration leads to significant L2 writing outcomes in global text features (organization, development, cohesion) and elevates teamwork and confidence compared with face-to-face collaboration (Albeshir, 2024). In content-area EAP settings, frequent Google-Docs activities and longer time on tasks were linked to better collaborative writing, and students considered the platform usable, engaging, and productivity-enhancing (Dehghanzadeh et al., 2024). Examining Google Docs' affordances on Korean university students' English writing, Zhang et al. (2025) found that comments predict long-term gains, whereas track changes align with short-term writing quality—underscoring behavior-specific effects on performance.

Learning experience in collaborative L2 writing supported by Google Apps

Computer-mediated communication (CMC) tools like Google Apps have significantly reshaped collaborative L2 writing by fostering learner agency, engagement, and motivation through authentic, interactive tasks (Alsahil, 2024; Blin & Appel, 2011; Chao & Lo, 2009; Dehghanzadeh et al., 2024; Li & Zhu, 2013; Martinsen & Miller; Wang, 2014). Google Docs, in particular, enables learners to engage in observable, iterative writing processes that involve sharing multimodal resources, organizing content, providing peer feedback, and revising drafts collaboratively (Abrams, 2016, 2019; Bikowski & Vithanage, 2016; Ebadi & Rahimi, 2017, 2019; Jeong, 2016; Kessler et al., 2012; Liu & Lan, 2016). Ebadi and Rahimi found that EFL students in Iran perceived dynamic assessment via Google Docs positively, as it improved their academic writing for IELTS tasks through peer mediation. Similarly, Liu and Lan (2016) reported greater vocabulary gains among collaborative writers versus individuals, supporting the idea that knowledge co-construction promotes language acquisition—a finding echoed by Wang (2014) in wiki-based writing environments.

From an interactionist perspective, Google Docs supports multifaceted collaboration—between students, instructors, content, and interface—which enhances the learning experience (Ishtaiwa & Aburezeq, 2015). Their study of pre-service teachers in the UAE revealed strong satisfaction with peer and instructor interaction, though they recommended addressing learners' technological proficiency to optimize student-interface engagement. Echoing these benefits, Korean EFL learners appreciated Google Docs for its accessibility and creative potential in collaborative writing tasks (Jeong, 2016). Further expanding on its affordances, Akoto (2021) demonstrated that U.S. French learners, using Google Docs to create digital postcards, developed greater multimodal awareness and genre knowledge. His findings, aligned with Oskoz and Elola (2020), and supported by Yi and Angay-Crowder (2016), suggest that

collaborative multimodal writing via digital platforms motivates learners, improves writing proficiency, and supports peer assessment and knowledge co-construction. Of note, Saeed and Al Qunayeer (2020) found that L2 learners' deep cogitation of writing scaffolded by teacher-student interaction created a more engaging and reflective learning experience. This was because, as explained, these learners tended to capitalize on this ongoing "feedbacking" and "refeedbacking" loop supported by Google Docs with constant negotiation and reflection. However, despite that, significant improvement in academic writing skills such as lexical resources and task response were reported in Hoang and Hoang's (2022) study, whose participants from a Vietnamese high school exuded mixed opinions in relation to the enjoyment of honing their academic writing skills with Google Docs. In particular, some voiced their concerns about unequal group participation, collaboration fatigue, and a preference for working individually due to personal or technical reasons. Consistent with these mixed reactions, recent work shows that learners recognize Google Docs' pedagogical and technological affordances (e.g., sharing, editing, revision visualization) but not its social affordances unless interaction is deliberately engineered through structured, in-document protocols (Alsahil, 2024).

Multimedia learning in collaborative L2 writing

Multimedia learning has become integral to EAP/ESP classrooms in the U.S., where digital environments are reshaping how English learners consume and produce information. To enhance engagement and comprehension, L2 educators increasingly incorporate tools like Google Apps, Flipgrid, and Edmodo, which not only support content learning but also foster collaboration and digital literacy (Elola & Oskoz, 2017). As multimedia learning involves multiple sensory modes—visual, auditory, and textual—learners can better process complex information through multimodal input (Mayer, 2001; Sankey et al., 2010). Mayer's (2014) cognitive theory highlights that dual-channel, limited-capacity, and active processing assumptions guide how learners internalize knowledge. To put it another way, human minds can decipher an abstract concept or a complex procedure more effectively by seeing both texts and pictures. In collaborative writing tasks, for instance, L2 learners may use graphs or animations in Google Slides to communicate ideas clearly, aligning with Krashen's (1989, 2003) Comprehensible Input hypothesis, which emphasizes delivering meaningful messages for improved language acquisition.

While face-to-face collaboration involves rich nonverbal communication, digital environments rely on two-dimensional platforms that demand new strategies for interaction and meaning-making. In these settings, L2 educators can leverage multimedia tools to compensate for the lack of physical cues and maximize learners' engagement and understanding. Collaborative writing in digital contexts thus redefines genre conventions, requiring educators to move beyond text-based instruction and integrate a variety of semiotic resources tailored for CALL and MALL environments. Such digital transformations challenge instructors to facilitate deeper learner interaction and scaffold comprehension through intentional use of multimodal materials in collaborative writing tasks. Addressing this topic, Pham (2021) illustrates that digital platforms may catalyze this form of collaborative learning by providing various modes of multimedia learning, thereby fostering deeper language learning engagement and promoting cognitive development.

Understanding multimodalities in collaborative L2 writing

Sociocultural theory posits that signs and symbols mediate cognitive development, shaping how individuals internalize and reconstruct psychological processes through social interaction (Johnson, 2004; Vygotsky, 1978). In digital contexts, meaning is often conveyed not just through text, but through culturally shaped visual and symbolic signs—such as logos and

interface icons—which learners readily interpret. This shift demands a broader understanding of communication, one that incorporates multimodality—the use of integrated modes like visuals, sounds, and animations to express meaning (Kress, 2009; Kress & van Leeuwen, 2001). As digital literacy becomes essential in the 21st century, collaborative learning must move beyond monomodal approaches, allowing L2 learners to use multimodal resources to co-construct meaning and express identities, particularly in CALL and MALL environments (New Media Consortium, 2005; Yi & Angay-Crowder, 2016).

In the technology-driven world, collaborative writing has transformed beyond merely the forms of static and traditional texts; instead, there is a growing advocacy for multimodal writing, where L2 learners may co-construct and decode meanings through multifaceted elements, such as visuals, audio, animations, and digital media (Li & Zhang, 2021). To optimize L2 learners' digital writing experiences, educators should scaffold the orchestration of both linguistic and digital modes in collaborative tasks. Digital multimodal composing (DMC) empowers learners to creatively express themselves and interact meaningfully with peers and instructors, enhancing both autonomy and engagement (Jiang, 2017). Google Docs, a widely used tool in collaborative L2 writing, supports this process by facilitating planning, drafting, feedback, and revision through synchronous and asynchronous interaction (Elola & Oskoz, 2017). Rooted in Vygotsky's ZPD, this collaborative framework allows learners to progress through peer scaffolding and guided support. Compared to traditional approaches, Google Apps foster dynamic, multimodal collaboration, enabling learners to communicate meaningfully and effectively in digital academic contexts.

Despite that quite a wealth of research has converged to one point — Google Apps can fuel L2 learners' motivation in collaborative learning projects like L2 writing as well as galvanize them to generate desired outcomes while appreciating others' comments and feedback—little is known when it comes to the EAP context concerning the key factors such as formative assessment, course type, and linguistic and cultural background through the lens of sociocultural theory. As such, the study discussed herein seeks to fill this void by addressing the following research questions:

1. Is there any relationship between students' overall learning experiences and their achievement tests?
2. Are there any differences in the overall learning experiences of collaborative learning supported by Google Apps between the students in the Academic Writing class and the ones in the Advanced Business class?
3. Are there any differences in the overall learning experiences of collaborative learning supported by Google Apps among students of different cultural and linguistic backgrounds?

Methods

Context and participants

This study took place in an EAP language center affiliated with a large, public research university located in the Southeast of the United States. Participants, who had not yet met the university's direct-entry thresholds (e.g., IELTS 6.5; TOEFL iBT 79; PTE-A 53; Duolingo 110; GRE Verbal 153), were required to enroll in the intensive EAP program. Upon entry, participants were categorized into beginning, intermediate, or advanced tracks based on a pre-assigned diagnostic writing assessment. Then, instructors would align their instruction and academic track courses with their existing competencies, with intermediate/advanced students taking Academic Writing, only advanced students allowed to take Business English, and beginning students focusing on foundational grammar, vocabulary, and communicative

competence. For the purpose of this study (IRB# Pro00036936), permission to conduct this research was granted by both the language center and the Institutional Review Board of its affiliated university. In this study, the teacher assumed a dual role as both course instructor and researcher. While such a pre-existing instructional relationship has the potential to influence participants' perceptions and engagement, deliberate measures were adopted to reduce hierarchical distance. The other two researchers, also co-authors of this article, closely monitored the entire in-class and online collaborative learning environments and supported the teacher-researcher in facilitating writing activities by positioning students as co-constructors of knowledge and encouraging reciprocal feedback, thereby mitigating power imbalances and promoting authentic participation.

This study focuses on two courses an EAP instructor taught, an Academic Writing (AW) Class and an Advanced Business (AB) Class. The AW class aims to provide intensive language training for EAP students from beginner to advanced levels, preparing them for success in an American college or university. Apart from requiring EAP students to improve their English competence gauged by standardized English language proficiency tests such as TOEFL, IELTS, or Duolingo, etc., the AB class, designed for international students during the transitional period, was part of the pathway program in which EAP students can enroll in courses progressively related to the business major at the university. From the instructor's AW Class and AB Class, we recruited twenty-three students who came from diverse linguistic backgrounds. Following the guidelines of the Institutional Review Board, the instructor introduced the granular details of this project to her students and collected the written consent forms from these twenty-three participants who expressed interest and willingness to cooperate with the researchers. All participants were informed about the research aims, procedures, and their right to withdraw at any time without penalty. Written informed consent was obtained prior to data collection, and confidentiality was ensured by anonymizing all responses. To avoid any perceived pressure or bias, grading for course assignments was completed before the analysis phase and was handled independently from the research activities, ensuring that participation or responses had no impact on students' academic evaluations of their pathway programs.

There were nine Mandarin-speaking students (eight from Mainland China and one from Taiwan region), 11 Arabic-speaking students (all from Saudi Arabia), two Spanish-speaking students (both from Venezuela), and one Japanese-speaking student (from Japan). The EAP instructor employed Google Apps to facilitate the learning process of both the AW Class and the AB Class, providing clear instructions to guide her students to interact with each other inside and outside her classes.

Instruments

The participants from both classes were able to follow the instructor and complete all the required activities and projects during the fourteen-week period in the language center. At the end of the semester, they were asked to present their perceptions by taking an adapted five-point Likert scale survey developed by Liontas (1999). The survey, *Overall Learning Experience Questionnaire via Google Apps* (Appendix A), was composed of two parts, with one asking the participants to input their demographic information and the other leading them to report their overall learning experience of using Google Apps to interact with their peers and the instructor. We employed an online survey tool, Qualtrics, to conduct the survey.

Specifically, the participants were expected to document their answers in the *Qualtrics* survey, sharing their thoughts on incorporating Google Apps into their class activities and projects by

using the scale range of 1 to 5 to indicate the extent to which they agreed or disagreed with the statements in four subscales: Attitude, Motivation, Multimedia Learning, and Collaborative Learning. Each subscale consisted of 5 items measuring the participants' perceptions pertinent to each construct. Furthermore, in order to understand the relationship between the participants' academic achievement and overall learning experience on Google Apps, we also employed their final exam score.

Results

Internal consistency reliability

With an aim to test the internal consistency reliability of the adapted survey, a Cronbach's (1951) analysis was conducted on all four subscales (Attitude, Motivation, Multimedia Learning, Collaborative Learning) of the post training survey, *Overall Learning Experience Questionnaire via Google Apps*. The analysis was deduced through calculating Cronbach's alpha from *SPSS Statistics 23* and it was found that the subscales' alpha level was .959, which indicates that the subscales have an adequate level of inter-item reliability.

According to Nunnally (1978), instruments for basic research should have a reliability of .70 or higher. As such, the instrument, *Overall Learning Experience Questionnaire via Google Apps*, manifests an excellent internal consistency reliability rate since it is in concert with the criteria (George & Mallery, 2003): $\alpha \geq .9$ is Excellent, $.9 > \alpha \geq .8$ is Good, $.8 > \alpha \geq .7$ is Acceptable, $.7 > \alpha \geq .6$ is Questionable, $.6 > \alpha \geq .5$ is Poor, and $\alpha \leq .5$ is Unacceptable. By the same token, the internal consistency reliability of the four subscales, which are shown in Table 1, reveals how well the items under each subscale measure the same idea or construct. Given that the Cronbach's alpha for the four subscales are consistently higher than 0.7, it can be understood that the internal consistency reliability of the four subscales is good. This step ensured that the survey we adapted is a reliable instrument.

Table 1

Reliability of the Instrument, Overall Learning Experience Questionnaire via Google Apps

Subscale	N of items	α	95% CI of α
Attitude	5	0.869	0.759-0.937
Motivation	5	0.811	0.653-0.910
Multimedia Learning	5	0.909	0.833-0.957
Collaborative Learning	5	0.819	0.669-0.914

Note. N of item=number of items; α =Cronbach's alpha; CI=confidence interval.

Research Question One: Is there any relationship between students' overall learning experiences and their achievement tests?

Descriptive statistics

A descriptive statistics analysis was conducted using *SPSS Statistics 23* to present the mean of each subscale along with critical information including the number of participants, standard deviation, skewness and kurtosis. As seen in Table 2, the mean of the average score of each

subscale is higher than 3 (Neutral), indicating that the majority of the participants agreed as to whether or not they had an overall pleasant experience using Google Apps to support their collaborative English writing. In particular, the mean (3.91) of the average scores in the Collaborative subscale, which was higher than the other three subscales (Attitude: 3.82, Motivation: 3.65, Multimedia Learning: 3.81), indicates that most of the participants agreed that Google Apps promoted their collaborative learning. The minimum values for attitude average, motivation average, multimedia average, and collaborative average on a 5-point Likert scale are 1.80, 2.00, 1.80, and 1.80, respectively, which are closer to the *disagree* option, whereas the maximum value for all the four subscales are 5.00 on a 5-point Likert scale.

Table 2
Descriptive Statistics of the Mean of Each Subscale

	N	Min	Max	Mean	SD	Skewness	Kurtosis
Attitude_Ave	23	1.80	5.00	3.82	0.93	-0.426	-0.472
Motivation_Ave	23	2.00	5.00	3.65	0.93	-0.072	-0.829
Multimedia_Ave	23	1.80	5.00	3.81	0.89	-0.631	-0.001
Collaborative_Ave	23	1.80	5.00	3.91	0.94	-0.481	-0.424

Note. Attitude_Ave = Average Score of the Attitude Subscale; Motivation_Ave = Average Score of the Motivation Subscale; Multimedia_Ave = Average Score of the Multimedia Learning Subscale; Collaborative_Ave = Average Score of the Collaborative Learning Subscale; N = the number of participants; Min = Minimum; Max = Maximum; SD = Standard Deviation; 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree.

Correlation

To further understand the inter-relationship of the four subscales (Attitude, Motivation, Multimedia Learning, Collaborative Learning) as well as the relationship between the participants' final exam score and the four subscales, Pearson correlation was conducted (see Table 3). First, it was found that the participants' final exam score has almost no relationship or a very weak positive relationship with all the four subscales. The results are not congruent with the study of Asoodar et al. (2015) who concluded that EAP students who demonstrated positive attitudes towards blogging and Wikis had better L2 writing performance than those who did not in an Iranian university.

Second, it can be seen that the correlation coefficients among the four subscales are very strong ($r > .80$, $p = .00$) suggesting that the subscales are measuring empirically similar dimensions, which are all related to the participants' overall learning experience supported by Google Apps. This finding also shows that the instrument demonstrates good homogeneity of the four subscales, indicating that the survey reflects students' impressions of collaborative L2 writing experience primed by the affordances of Google Apps.

Table 3
Subscale Inter-Correlations (N=23)

Learning Experience			Final Exam Score	Attitude	Motivation	Multimedia Learning	Collaborative Learning
Final Score	Exam	Pearson Correlation	1	.039	.074	-.172	-.009
		Significance (2-tailed)		.859	.737	.432	.967
Attitude		Pearson Correlation	.039	1	.846	.891	.863
		Significance (2-tailed)	.859		.000	.000	.000
Motivation		Pearson Correlation	.074	.846	1	.868	.896
		Significance (2-tailed)	.737	.000		.000	.000
Multimedia Learning		Pearson Correlation	-.172	.891	.868	1	.873
		Significance (2-tailed)	.432	.000	.000		.000
Collaborative Learning		Pearson Correlation	-.009	.853	.896	.873	1
		Significance (2-tailed)	.967	.000	.000	.000	

Note. N = number of items; The average score of each subscale is calculated in SPSS.

Research Question Two: Are there any differences in the overall learning experiences of collaborative learning supported by Google Apps between the students in the Academic Writing class and the ones in the Advanced Business class?

One Way ANOVA

While investigating how differently the participants from the Academic Writing Class and the Advance Business Class perceived their overall learning experience via Google Apps, we found that all the means of the Advanced Business class (AB_attitude=20.70, AB_motivation=20.90, AB_multimedia=20.50, AB_collaborative=20.90) are higher than the means of the Academic Writing class (AW_attitude=17.85, AW_motivation=16.23, AW_multimedia=17.92, AW_collaborative=18.54) (see Table 4). Notably, there is a statistically significant difference in the Motivation subscale (AW mean score=16.23, AB mean score=20.90), with an associated *p*-value, 0.013.

This difference illustrates that the participants in the Advanced Business Class were more captivated to utilize Google Apps to collaborate with their peers for group assignments or projects. In other words, the Google apps employed in the Advanced Business class empowered the participants to deconstruct the target knowledge visually and textually, contribute to the group activities or projects equally, and receive constructive feedback from their peers and the instructor willingly. Specifically, these mean differences among the four subscales between the two classes are pertinent to the course objectives and student learning outcomes. The Academic Writing Class aimed to help EAP students develop their English language abilities in writing and editing for academic studies. The course focused on argumentative writing while editing for grammatical accuracy. In the Advanced Business Class, the participants explored various business topics through readings, discussions, and written responses. The learners were also engaged in tasks and projects related to real-world business issues and practices.

Table 4

Descriptive Statistics of the Overall Learning Experience of Each Class

Learning Experience	N	Mean	SD	SD Error	Significance
AW_attitude	13	17.85	4.375	1.213	0.149
AB_attitude	10	20.70	4.715	1.491	
AW_motivation	13	16.23	3.876	1.075	0.013
AB_motivation	10	20.90	4.408	1.394	
AW_multimedia	13	17.92	4.132	1.146	0.177
AB_multimedia	10	20.50	4.696	1.485	
AW_collaborative	13	18.54	3.865	1.072	0.190
AB_collaborative	10	20.90	5.567	1.760	

Note. N = number of items; AW = Academic Writing; AB = Advanced Business; SD = standard deviation. Results procured via SPSS quantitative analysis on descriptive statistics for Overall Learning Experience Questionnaire via Google Apps subscales.

Research Question Three: Are there any differences in the overall learning experiences of collaborative learning supported by Google Apps among students of different cultural and linguistic backgrounds?

Kruskal-Wallis Test

Given that most of the participants are from two major cultural and linguistic backgrounds, two Spanish speaking students were removed and the rest of the 21 participants were regrouped, with one Asian group consisting of three countries/regions (8 from Mainland China, 1 from Taiwan, China, and 1 from Japan) and one Arabic group (all from Saudi Arabia, N=11).

Intentionally, we incorporated the participant from Japan into the Asian group as China and Japan have many cultural and linguistic similarities, such as Confucian values, conservative moderation, Buddhist history, and Kanji Script/汉字 (both are pictograms) (see Turturici, 2019).

After taking out the two Spanish speaking students, we employed both a descriptive analysis and a Kruskal-Wallis test to compare the differences of the participants' overall learning experience via Google apps in the aforementioned two groups. The Kruskal-Wallis (1952) test allowed us to parse the differences between the two groups of unequal number of participants, who presented their ratings upon the four subscales, *Attitude*, *Motivation*, *Multimedia Learning*, and *Collaborative Learning*. As seen in Table 5, the mean of the Asian group in each subscale is consistently higher than that of the Arabic group. Comparatively speaking, these differences mean differences among the four subscales suggest that the participants in the Asian group had a slightly more pleasant learning experience of using Google apps to support their collaborative group projects or assignments. Of note, a statistically significant difference is found in the Collaborative Learning subscale between the two groups with the $p = .046$, indicating that the Asian group instilled more passion into their group work supported by online tools, such as Google Docs, Google Slides, Google Spreadsheet, etc.

Table 5

SPSS Quantitative Analysis on the Overall Learning Experience between Asian Group and Arabic Group

	N	Mean	SD	Asymptotic Significance
Asian_Attitude	10	19.40	4.55	0.750
Arabic_Attitude	11	18.45	5.18	
Asian_Motivation	10	20.10	4.22	0.075
Arabic_Motivation	11	16.18	4.62	
Asian_Multimedia	10	20.10	3.92	0.357
Arabic_Multimedia	11	18.09	5.30	
Asian_Collaborative	10	21.40	3.77	0.046
Arabic_Collaborative	11	17.36	4.94	

Note. N = number of items; Asian_Attitude = Asian Group Attitude Total; Arabic_Attitude = Arabic Group Attitude Total; Asian_Motivation = Asian Group Motivation Total; Arabic_Motivation = Arabic Group Motivation Total; Asian_Multimedia = Asian Group Multimedia Learning Total; Arabic_Multimedia = Arabic Group Multimedia Learning Total; Asian_Collaborative = Asian Group Collaborative Learning Total; Arabic_Collaborative = Arabic Group Collaborative Learning Total; SD = Standard Deviation; Asymptotic Significance = Asymptotic Significance in Kruskal Wallis Test.

Discussion and Conclusions

Due to the limited and context-bound sample, the results of this study should be viewed as preliminary and may not be broadly applicable across diverse L2 writing settings. While prior studies have highlighted the affordances of Google Apps in enhancing L2 learners' collaborative writing and feedback exchange (Avellaneda, 2016; Bikowski & Vithanage, 2016; Ebadi & Rahimi, 2017; Suwantarathip & Wichadee, 2014), its application in EAP contexts of diverse cultural and linguistic backgrounds remains underexplored. This study investigated how Google Apps could support English learners' academic writing development within EAP classes, guided by sociocultural theory (Vygotsky, 1978) and cognitive theory of multimedia learning (Mayer, 2001, 2014). Despite varied linguistic, cultural, and academic backgrounds, participants generally responded positively to the collaborative learning environment afforded by Google Apps, particularly in exchanging peer feedback and co-constructing knowledge. These findings align with earlier research that emphasizes motivation, scaffolding, and knowledge negotiation through digital collaboration (Albeshir, 2024; Dehghanzadeh et al., 2024; Kessler et al., 2012; Liu & Lan, 2016), reinforcing the significance of a multimodal, interactive learning ecology (Li & Zhang, 2021; van Lier, 2000). Thus, it is pivotal for L2 educators to address the evolving multimodal literacy demands of the digital age (Saeed & Al Qunayeer, 2020; Storch, 2021), in which learners are mostly predisposed to value learning autonomy and seek direct support in a dialogic and collaborative learning environments.

Although no significant correlation was found between participants' final exam scores and their reported experiences on subscales like Attitude, Motivation, Multimedia Learning, and Collaborative Learning, learners still expressed enjoyment in the collaborative process. Consistent with studies by Ebadi and Rahimi (2017), Jeong (2016), and Suwantarathip and Wichadee (2014), participants valued multimodal resource sharing and peer feedback in shaping their writing. The difference in motivation levels between the Advanced Business and Advanced Writing classes was particularly notable, with the former reporting significantly higher motivation ($p = 0.013$). This may be attributed to students' ability to contextualize projects through relevant life or work experiences. These findings support the pedagogical potential of CLIL (Content and Language Integrated Learning), suggesting that aligning EAP instruction with students' disciplinary interests can boost engagement and learning outcomes (see Aguilar & Rodríguez, 2012; Dehghanzadeh et al., 2024; Lasagabaster & Doiz, 2016).

Further analysis revealed a noteworthy cultural-linguistic distinction: participants from the Asian group demonstrated more favorable attitudes toward Google Apps than their Arabic-speaking peers ($p = 0.046$). This difference could stem from prior exposure to similar collaborative platforms like Tencent Docs, allowing Asian students to adapt more seamlessly. These findings echo Ishtaiwa and Aburezeq's (2015) and Hoang and Hoang's (2022) conclusion that technological familiarity plays a key role in learners' interface interaction. Hence, before integrating digital tools into EAP writing instruction, educators should consider offering training modules to develop students' technological competence and ensure equitable access to digital collaboration. Equally important, because the social affordances of Google Docs do not emerge automatically and activity traces relate only moderately to contribution quality, educators should engineer group dynamics—establishing clear roles and responsibilities and coaching feedback uptake—to sustain active participation (Alsahil, 2024; Dehghanzadeh et al., 2024); at the same time, they should allow opt-in individual work when personality or technical constraints warrant it (Hoang & Hoang, 2022).

In conclusion, this study affirms the transformative potential of Google Apps in facilitating multimodal, collaborative academic writing grounded in sociocultural learning. The

proliferation of digital tools continues to drive the “social turn” in L2 writing (Li & Storch, 2017), underscoring the need for EAP instruction to embrace multiliteracies that integrate linguistic diversity and multimodal expression (Rowell & Walsh, 2011). The multimedia affordances of Google Apps—such as revision history, asynchronous feedback, and voice typing—empower learners to take collective ownership of writing and reflect real-world communication. Future research should examine how variables like EAP students’ learning styles and behaviors, time spent on Google Apps, frequency of interaction, and digital output types correlate with learning outcomes, offering further insights into optimizing collaborative EAP instruction in the digital age.

Limitations

Despite revealing notable differences across class types and cultural-linguistic groups, this study has several limitations concerning generalizability, applicability, and validity. The small sample size of 23 participants, drawn via convenience sampling from two EAP classes, limited statistical power and increased the likelihood of false-positive results. Thus, the findings of this study may be interpreted as tentative and may not be generalizable to other EAP contexts, although they align with prior research (e.g., Avellaneda, 2016) highlighting the motivational and instructional value of Web 2.0 tools like Google Docs. Moreover, the 5-point Likert scale used in the questionnaire may not have captured the full nuance of learners’ experiences, suggesting the need for a more granular instrument—such as a 10-point scale or continuous interval measure (for future research see Bishop & Herron, 2015). Finally, as the study spanned only one semester, students’ perceptions may not reflect long-term engagement with Google Apps. Longitudinal studies tracking learners’ progress, usage patterns, and peer feedback behaviors over time would provide deeper insights into the sustained impact of Google Apps on EAP learners’ writing development.

Appendix

Survey adapted from Dr. Lontas’ (1999) dissertation

Lontas, J. I. (1999). *Developing a pragmatic methodology of idiomaticity: The comprehension and interpretation of SL vivid phrasal idioms during reading*. Unpublished doctoral dissertation, The University of Arizona, Tucson, AZ.

1. Last four digits of your student ID number
2. Birthday (month/day/year)
3. Gender: a. male b. female
4. Years of learning English
5. Country
6. First language

Instructions: We would like to know your thoughts on learning English via Google Apps in the EAP class. Read each statement carefully, think about it for a few seconds, and use the scale range of 1 to 5 to indicate the extent to which you agree or disagree with each of the following statements:

- 1= Strongly Disagree
- 2= Disagree
- 3= Neutral/Unsure
- 4= Agree
- 5= Strongly Agree

Attitude Subscale:

- A1. Google Apps should be included in the EAP curriculum.

- A2. Google Apps should be used for classroom practice and testing.
- A3. I think Google Apps are useful in everyday English learning.
- A4. Google Apps are easy to use.
- A5. I learn English best when it is accompanied by a variety of Google Apps.

Motivation Subscale:

- M1. I am motivated to use Google Apps in the EAP class.
- M2. I like to use Google Apps on a regular basis.
- M3. I like to write dialogues, narratives, and/or short stories on Google Docs.
- M4. I like to be taught the skills and processes necessary to improve my English via Google Apps.
- M5. I like to work things out on my own when learning English.

Multimedia Learning (ML) Subscale:

- ML1. Verbal (textual or audio) and visual (graphic, photographic, or video-graphic) information on Google Apps help activate my knowledge of the content acquired in class.
- ML2. Illustrations and graphics on Google Apps support my English learning.
- ML3. Incorporation of graphics and illustrations on Google Apps should be a main part of instructional activities.
- ML4. Authentic audio/video recordings and real texts on Google Apps should accompany the English learning.
- ML5. Google Apps should be presented in a way that supports my learning styles.

Collaborative Learning (CL) Subscale:

- CL1. Collaborative pair and group activities should be encouraged.
- CL2. I like to discuss the meaning of English vocabulary in small group activities.
- CL3. It is useful to me to collaborate with my peers on Google Apps.
- CL4. I like to learn and practice English in a variety of group activities supported by Google Apps.
- CL5. If I had to perform a task, it would be nice to try different Google Apps to do it: Google Docs, Google Sheet, Google Slide, etc.

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