Birhan and Nurie
Asian. J. Second. Foreign. Lang. Educ. (2024) 9:11
https://doi.org/10.1186/s40862-023-00232-2

Asian-Pacific Journal of Second and Foreign Language Education

RESEARCH Open Access

Developing engineering students' engagement in academic writing classes using corpus-based instruction

Amare Tesfie Birhan[1*] and Yenus Nurie[2]

*Correspondence: amaretesfie@gmail.com

[1] Bahir Dar Institute of Technology, Bahir Dar University, Bahir Dar, Ethiopia
[2] Humanities Faculty, Bahir Dar University, Bahir Dar, Ethiopia

Abstract

Engagement is a core issue in language teaching and learning. Without the students' active involvement in the teaching–learning process, educational objectives could not be achieved. Accordingly, the concept of engagement has been the focus of researchers, practitioners, and policymakers. This research examined the effects of corpus-based instruction on engineering students' engagement in academic writing classes. The participants were 77 randomly selected fourth-year mechanical engineering students. The data were gathered through a self-reflective report and a journal and analyzed through an independent t-test, One-Way ANOVA, and narration techniques. The data showed that students who were instructed via corpus-based instruction improved their behavioral, emotional, and cognitive engagements better than their counterparts; the experimental group enjoyed the activities and actively participated in different academic writing processes. The data also attested that there was a significant statistical difference between the experimental group and the control group engagements. This research implied that EFL teachers should consider genuine and real-life linguistic features and activities when they design academic writing instruction to enhance their engagement during the instruction.

Keywords: Behavioral, Cognitive, Corpus, Emotional, Engagement

Introduction

Engagement is a way of students' involvement in the teaching and learning process inside and outside the classroom. It is related to students' interests and enthusiasm and involves learners' positive behaviors such as attendance, paying attention, and classroom participation (Olson & Peterson, 2015). Ke and et al., (2015, p 1) stated that "engagement is a collection of mindfully and goal-directed behaviors and reflections demonstrated to indicate a meaningful and deep involvement in learning activities." On the other hand, Coates (2008) looked it as students' participation in activities that help them to produce high-quality learning. It also refers to the extent of students' involvement with a content learning activity (Helme & Clarke, 2001; Norazmi et al., 2017). Engagement encompasses learners' emotional, behavioral, and cognitive aspects (Fredricks & McColskey, 2012).

The first aspect of engagement is cognitive engagement which expands mental efforts in language learning activities (Helme & Clarke, 2001), and it concerns students' level of investment during instruction, such as being thoughtful, strategic, and willing to exert the necessary effort for understanding difficult ideas. This is also linked to learners' motivation, self-regulation in learning, and self-efficacy (Nolen, 1995; Pintrich & De Groot, 1990); whereas, behavioral engagement refers to the extent to which learners are actively participating in activities inside and outside the classroom. It also focuses on showing positive conduct such as following rules, doing activities without skipping, and adhering to classroom norms. It also includes students' participation in classroom activities (on-task) (Norazmi, et al., 2017). Students show positive behaviors while they enjoy and are satisfied with the interaction. The other engagement aspect is emotional engagement which refers to the extent of positive and negative reactions to teachers and classrooms. It also concerns giving value and appreciation to the task they involve. It concerns issues related to students' feelings of belonging or value to the lesson, interests, and positive emotions (Fredricks et al., 2004; Norazmi, et al., 2017).

It is believed that students with high engagement exert much effort for learning and involve actively in classroom instruction. According to Helme and Clarke (2001), students who initiate their minds to learning are much more likely to learn successfully than students whose engagement with the subject matter is low" (p 133). They acquire knowledge and skills easily and retain them permanently, and they also spend more time on tasks in and out of the classroom by practicing through self-directed learning and guided tasks. Thus, it is considered one of the impacts that affect students' academic achievement. Consequently, the issue of engagement has become a research interest for several years to enhance students' academic achievement in secondary and territory education (Friesen, 2010).

Other researchers (e.g. Kuh, 2010; Matsushita, 2018; Shi et al., 2018) indicated that students' engagement is related to several factors such as the type of instruction, the nature of work students are asked to do, and the types of technology they utilize in their learning. Besides, Abubakar (2017) mentioned that students' level of engagement is influenced by their experiences, expectations, and aspirations. Lo and Hyland (2007) also reported that students' level of agency, feeling of mastery, interest, and attitude toward learning activities have also contributed to students' engagement. These studies indicated that students' engagement could have been affected by different factors such as classroom practices, the nature of the content, and the instruction.

Students' active involvement is crucial to attend general education and to learn and improve language skills. Among English language skills, writing skills proficiency depends on students' involvement; it requires students' active participation in the teaching and learning process. These help them improve their academic writing literacy, participate in different academic writing activities, and employ various learning strategies (Cleary et al., 2018).

However, for the last centuries, the lack of a proper instructional approach and unrealistic examples and activities have had a great impact on engineering and technology students' engagement in academic writing classes. The conventional teaching writing approach which has been practiced in Ethiopia for centuries has undermined students' involvement in the teaching and learning process. EFL teachers did not include

authentic linguistic features in the instruction process, and contents were unrelated to the students' field of study and interest. Kim and Kim (2020, p. 1) reported that "despite the importance of preparing students to write successfully in their academic and professional careers, instructors often struggle to sustain students' focus on the complex and demanding nature of the writing process."

Moreover, this approach included unfocused linguistic features that created differences in students' engagement. Pugh and et al., (2017) also stated that the negative consequence of non-uniformity in engagement in the classroom is boundless. O'Sullivan (2010, p. 21) stressed that "the lack of clear evaluation and judgment in academic writing often leads novice writers to believe that engagement in such practice at any level is inappropriate." These indicated that students' engagement was disregarded in the conventional academic writing instruction. This seemed to be the reason that engineering students developed negative conceptions towards improving their writing skills (Birhan, 2018).

EFL writing classes have been characterized by the prevalence of teaching practices with less significant linguistic features that are not used frequently in their field of study, and these challenged learners to communicate effectively and construct various academic texts (Birhan et al., 2021). These indicate that the wrong teaching practices have contributed to the lack of engagement in the teaching–learning processes. In this instructional approach, students did not get a chance to learn authentic linguistic features, examples, and activities which restricted them to involve in the teaching and learning process where students were taught untargeted linguistic features. Accordingly, students were neglected in the whole instruction process.

Effective linguistic feature awareness depends on learners' active engagement both affectively and cognitively (Borg, 1994). This is because their level of engagement increases when they find the content interesting and they think they would use selected linguistic features for their social and academic purposes. Lo and Hyland (2007, p 221) also stated that "students' engagements are enhanced by providing relevant linguistic elements as well as designing writing tasks which give opportunities for social interaction and self-expression." Realistic and authentic linguistic features are not artificial linguistic items and trivial examples, rather they are genuine linguistic contents that are produced by a variety of writers. An instruction that considers students'gap initiated learners to participate in different meaning-making activities. Accordingly, using corpus-based instruction in EFL classrooms seems crucial to address the communicative gaps of learners in their academic writing context. Hence, the main objective of this research was to examine the effects of corpus-based instruction on engineering students' engagement in academic writing classes.

Literature review

Corpus-based instruction and students' engagement

Corpus-based instruction is an instructional approach that offers an opportunity for students to have a meaningful interaction with real-life activities. It is used to expose students to genuine linguistic features which are compiled in user-friendly software and exploited systematically. This instruction provides linguistic elements that help learners use and participate in various academic writing activities (Gray & DiLoreto, 2016). While

students are instructed with authentic activities, it is believed that they engage actively to discover the structures and functions of linguistic features. Barabadi and Khajavi (2017) also explained that learners' active role in the learning process via self-discovery, interactive, and bottom-up learning processes initiated them to engage actively in academic writing activities. These processes help students increase their engagement in academic writing classes. Willis (1990) and Akbari and et al., (2016) also reported that genuine and real-life linguistic features and expressions enhance learners' interest which contributes to their engagement.

In a similar vein, the instruction encourages learners to consider linguistic features that are relevant, teachable, frequent, and satisfy engineering students' academic writing needs. The instruction offers viable linguistic resources such as lexical bundles (phraseology units) and metadiscourse devices that students use in their communicative situations. In academic writing, researchers (Birhan, 2021; Shirazizadeh & Amirfazlian, 2021) reported that these linguistic features occur frequently in different academic writing genres, and they facilitate communication between a reader and a writer. Thus, to enhance students' engagement in the teaching and learning process, students should be instructed via an instructional approach which embeds authentic linguistic features.

Engagement in academic writing classes

Academic writing skills are among the crucial skills for higher education students. It enables them to use the skills in their general, academic, and professional contexts and is assumed to be helpful to write projects, research, conference papers, and internship reports and to have meaningful communication among international academic discourse communities (Isnin, 2017).

In teaching academic writing skills, students engagement is crucial to understand the writing culture and the norms of a particular discipline and improve their writing skills. It helps to master the micro and macro skills that are important to construct an effective text. Borg (1994) stated that effective language awareness depends on engaging learners both affectively and cognitively. It is a determinant factor for writing development (Norazmi et al., 2017).

Accordingly, students' engagement in academic writing classes should be mediated with authentic linguistic features that are considered by corpus-based instruction. While using corpus-based instruction, students discover the meaning and structure of linguistic features through data-driven or corpus-enriched materials. The self-determination learning theory indicates that while students' choice and self-regulating learning are presented, their cognitive and emotional engagement is increased (Brown, 2007). Moreover, Bass-Dolivan (2011) explicated that students' interaction with authentic activities enhances their classroom engagement. While students are instructed through authentic linguistic features, they exert their time and effort since they accept the activities are important for successful academic text compositions.

Learners understand the contextual structure and functions of different linguistic features such as lexical bundles and metadiscourse. In this instruction, students are allowed to participate in activities that provoke their engagement. The activities are designed from the corpus data that are assembled. Recently, researchers (e.g., Birhan, et al., 2021; Casan-Pitrach & Calvo-Ferrer, 2015; Huang, 2012) studied the impact of

corpus-informed instruction and reported that the instruction contributed to improve learners' vocabulary and writing skills. However, these researchers did not investigate the effects of corpus-based instruction on mechanical engineering students' engagements (behavioral, emotional and cognitive) in academic writing classes. Accordingly, this research was conducted to add some ideas to the limited literature on using.]corpus-based instruction in language classrooms.

This research attempted to answer the following research questions.

- What are the effects of corpus-based instruction on students' engagement in academic writing classes?
- Is there any statistically significant difference between the mean scores of the experimental group and the mean scores of the control group?

Method

Research design

The purpose of this research was to examine the effects of corpus-based instruction on engineering students' engagement in academic writing classes. Hence, to observe the effect of the instruction, the research followed a pre-test and post-test quasi-experimental research design.

Participants and sampling techniques

The participants of the study were fourth year mechanical engineering students of Bahir Dar Institute of Technology, Bahir Dar University. In this research, a total of 77 students were selected randomly and participated. These students gave consent to participate in the research and ethical clearance was obtained from the Department of Mechanical Engineering. Among these students, 38 students were assigned to the experimental group, and the other 39 students were assigned to the control group. The two groups had attended preparatory school and passed the national entrance examination to be admitted in a university. They all also took Communicative English skills and Basic Writing skills courses as common courses in the university before they joined the pre-engineering program. They also took technical report writing and research method course (in which this research was conducted).

Data gathering instruments

Self-report survey

The self-report survey was designed to examine the effects of the instruction on students' level of engagement. The instrument included 27 items (nine items focused on behavioral engagement, eight items discussed on cognitive engagement, and ten items addressed on emotional engagement items), and it was administered to the selected participants before and after corpus-based instruction was made. These items were prepared with a five-point Likert scale, ranging from 5 to 1 scales (5 = always; 4 usually; 3 = sometimes; 2 = rarely; 1 = never), and they were adapted from Fredricks and McColskey, (2012) and Fredricks, et al. (2004) studies. The face validity and content validity of the instrument were checked by 10 English language and educational psychology instructors. Additionally, it was piloted to check its reliability. Based on students'

responses, the Cronbach Alpha value of the instrument was checked, and it was. 955 which proved the instrument was reliable. This instrument was administered for both the control and the experimental groups.

Journal

This is the other instrument that was employed to assess students' classroom engagement in academic writing classes. The reflective journal was used to examine students' engagement while they were being instructed through corpus-based instruction and to triangulate the quantitative data which were obtained through the self-report survey instrument. The instrument contained eight (8) open-ended (guided) items. These items focused on students' academic writing skills before corpus-based instruction was made, the students' views regarding the instruction, their feelings regarding learning lexical bundles and metadiscourse devices, level of participation, motivation, and role, and strategies that they used to understand and to do corpus-informed activities. This instrument was designed for only the experimental group.

Corpus design and intervention

Corpus design

In this study, the researchers considered self-designed corpora for material preparation and classroom intervention. This was the reason that the existing material which was used in the selected program did not address the specific academic writing needs of the selected group. Braun (2005) indicated that "the genuine materials in corpora which have been collected following pedagogical considerations do seem to create some problems of authentication" (p 51). Accordingly, small corpora (size, 563,612 words) were designed from published mechanical engineering articles that were selected through criteria that include representativeness, particular importance to the discipline, scope, coverage, and indexing.

To select journals, random sampling, particularly the lottery method was employed, and journals such as Advances in Mechanical Engineering, Mechanism and Machine Theory, Mechanical Systems and Signal Processing, International Journal of Mechanical Sciences, Archive of Mechanical Engineering, Journal of Mechanical Engineering, Periodica Polytechnica Mechanical Engineering and Chinese Journal of Mechanical Engineering were chosen. From these journals, 120 (15 articles in each journal) articles were selected.

The selected articles were the most downloaded, read, and cited articles based on the information which was found on the journals' website. AntConc corpus analysis software was also used to clean and analyze the frequency of metadiscourse devices and lexical bundles in the selected articles. Manual analysis was also employed to identify the specific function of the selected linguistic elements. The metadiscourse and lexical bundles were selected based on the taxonomies of Hyland (2005), Biber et al. (1999), and Biber et al. (2003). Moreover, the frequency cut-off points of the lexical bundles and metadiscourse have to occur in at least two research articles in each sub-corpus to avoid the idiosyncrasies of individual writers.

Intervention

The corpus-based instruction was implemented for twenty-four hours in the technical report writing and research method course. To observe the effects of the intervention, the students were instructed with corpus-informed material; whereas, the control group was instructed with conventional instructional material. The intervention was modeled through adapting a previously published genre-based cycle (Charles & Pecorari, 2016; Correa & Echeverri, 2017). The students engaged in the four stages of instruction including preparation, modeling, joint construction, and independent construction.

In the preparation stage, the students were negotiated regarding the instruction and were provided pedagogically relevant, teachable, and frequent lexical bundles and metadiscourse embedded with texts taken from previously published articles. The students examined the function and structures of those lexical bundles and metadiscourse which were presented. In the next stage, the researchers together with students discussed and analyzed academic writing genres. Students participated in text revision, data interpretation, and essay writing activities both individually and in groups. In the fourth and last stage, learners developed similar texts and became independent learners. They engaged in drafting, revising, and editing various academic writing genres independently The researchers provided assistance and scaffolded students while they were constructing academic texts and employing lexical bundles and metadiscourse devices in their essays and other academic text**s**.

The control group was taught with the conventional approach in which the theoretical aspects of report and research writing and the accompanying activities presented in the course materials were treated. This group also engaged in different academic writing activities (abstract writing, introduction, and data interpretation activities). However, they did not have exposure in the classroom to the activities on the selected metadiscourse devices and lexical bundles.

Data analysis

The data which were gathered through the self-report survey were analyzed through independent t-test and One-way ANOVA. Particularly, an independent t-test was used to observe if there was any significant statistical difference between the two groups. Whereas, One way-ANOVA was employed to observe if there was any difference between the two groups in their behavioral, emotional, and cognitive engagements. Additionally, the qualitative data which were gathered through the journal were analyzed qualitatively.

Results

Students engagement in corpus-based instruction

Self-report results of students engagement

The objective of this research was to examine if there was any statistically significant difference between the two groups (A and B) level of engagement as a result of corpus-based instruction. Accordingly, an assumption test was performed through an independent t-test and One-way ANOVA was also run to determine if there was

Table 1 Pre-intervention, independent t-test result of the two groups

	Groups	N	Mean		t-test for Equality of Means		
				Sig	t	df	Sig. (2-tailed)
Pre-intervention engagement result	Group A	38	2.7675	.162	.270	75	.788
	Group B	39	2.7436				

Table 2 Pre-intervention engagement One-Way ANOVA results of the two groups

	Group	ANOVA				
		Mean	df	Mean Square	F	Sig
Behavioral engagement	Group A	2.9211	1	.606	1.273	.263
	Group B	2.7436				
Emotional engagement	Group A	2.8026	1	.000	.001	.970
	Group B	2.8077				
Cognitive engagement	Group A	2.5789	1	.011	.027	.870
	Group B	2.6026				

any significant difference in their level of engagement before they were assigned into the experimental and control groups. Considering the remaining assumptions, which cannot be observed through SPSS, the normality of tests and homogeneity were checked.

As Table 1 below shows, Group A had mean (μ) = 2.76 and Group B had μ = 2.74, which indicated that the two groups had similar levels of engagement before corpus-based instruction was implemented. The independent t-test result $t(75) = 0.270$, $p = 0.778$ also indicated that there was no statistically significant difference between the two groups.

In a similar vein, One-Way ANOVA was also run to check if there were any significant statistical differences between the two groups in their behavioral, emotional, and cognitive engagements. Table 2 indicates that in behavioral engagement, Group A had μ = 2.9211 and B had μ = 2.743. In the emotional engagement, it was observed that Group A had μ = 2.802 and Group B had μ = 2.8077. Whereas, in the cognitive engagement Group A and B hand μ = 2.57 and μ = 2.60 respectively. These results confirmed that there were no major differences between the two groups.

The One-way ANOVA result also attested that there were no significant statistical differences between the two groups in behavioral, emotional, and cognitive engagements. Table 2 showed that both groups showed almost similar levels of engagement in the three (behavioral, emotional, and cognitive) engagement issues.

Considering the results of the assumptions made so far, the experimental group and the control group were compared in their post-intervention engagement by running the same statistical test.

The independent t-test result (See Table 3) proved that the experimental group had μ = 4.4533 which was better than the pre-intervention result. However, the control group had μ = 3.1795, which was less than students who engaged in corpus-based

Table 3 Independent t-test result of the two groups

	Group statistics					
	Participants	**N**	**Mean**	**t**	**df**	**Sig. (2-tailed)**
Post-intervention result	Experimental group	38	4.4533	11.786	75	.000
	Control group	39	3.1795			

Table 4 One-way ANOVA results of students' engagement result

	ANOVA					
	Group	**Mean**	**df**	**Mean Square**	**F**	**Sig**
Behavioral engagement	Experimental	4.5474	1	34.675	110.884	.000
	Control	3.2051				
Emotional engagement	Experimental	4.3760	1	26.387	69.008	.000
	Control	3.2051				
Cognitive engagement	Experimental	4.4286	1	32.545	113.091	.000
	Control	3.1282				

instruction. Nonetheless, these results do not tell whether or not there was a significant statistical difference between students' engagement in pre-and post-intervention. Hence, the inferential statistics was run to observe if there was a significant statistical difference between the two groups.

The result showed that $t(75) = 0.270$, $p = 0.000$ which proved that there was a statistically significant difference between students who were instructed through corpus-based writing instruction and students who were taught through the conventional instructional approach.

The post-intervention results indicated that students who were in the experimental group outperformed the control group. The mean value as well as the inferential statistics confirmed that the experimental group had a better level of engagement than the control group. This indicates that authentic and genuine linguistic features that the experimental group students were taught and motivated them to learn and improve their engagement in academic writing classes.

The One-way ANOVA result of the three engagement results in Table 4 also confirmed that the experimental group outperformed the control group in the three elements of engagement (behavioral, cognitive, and emotional). Particularly, the result attested that in the behavioral engagement, the experimental group had $\mu = 4.5474$ and the control group had $\mu = 3.2051$. The one-way ANOVA also showed (f, 110.884, df, 1, $P < 0.05$) there was a significant statistical difference between the two groups in their behavioral engagement.

In relation to emotional engagement, the table shows that the experimental group had $\mu = 4.3760$ and the control group had $\mu = 3.205$, in which the experimental group outperformed the control group in their emotional engagement. The inferential statistics result (f, 69.008, df, 1, $P = < 0.05$) also attested that there was a significant difference between the two groups.

In relation to cognitive engagement, it was indicated that the experimental group had $\mu = 4.4286$ and the control group had $\mu = 3.1282$. The ANOVA result also showed a significant statistical difference (f, 113.091, df, 1, $P = < 0.05$) between the experimental and the control groups. Therefore, according to the results, the experimental group showed better involvement in academic writing classes than the control group. Among the three engagement issues, the experimental group showed improvement in their behavioral and emotional engagements.

In the corpus-based instruction, the students were exposed to authentic activities and discipline-related linguistic features (lexical bundles and metadiscourse devices), and these helped them to improve their level of engagement. During the instruction, the students learned real-life examples and activities which contributed to enhance their engagement. Besides, they were actively involved in constructing academic writing genres such as abstract, introduction, and data interpretation and sub-academic writing genres such as problem solution and argumentative essays individually and in a group.

This proved that when the instructor taught academic writing skills through authentic and genuine linguistic features, the students accepted the contents and the instruction and improved their level of engagement. The data also confirmed that the instruction also helped students understand lexical bundles and metadiscourse features which occurred frequently in their field of study. The quantitative data obtained from the self-report survey indicated that students who received corpus-based instruction were engaged and motivated to participate in academic writing activities.

Journal results of students engagement in corpus-based instruction

Results obtained from the journal also indicated that students who were instructed through corpus-based instruction improved their level of engagement. The results were categorized into emotional, behavioral, and cognitive engagements. The first emotional engagement item focused on examining students' feelings regarding their academic writing skills before corpus-based instruction was conducted. Most students applauded that their academic writing skill was not good enough to communicate effectively. For instance, one student mentioned that "when I evaluate my academic writing skill, it is not good because I am not good at using mechanics and syntax." This student viewed academic writing as using appropriate mechanical aspects and understanding the structure of linguistic features. The respondent reported that his academic writing was poor, and he was not be able to communicate effectively with his audience in academic and other communicative events.

The other respondent mentioned, "my writing skill was low, but after I started taking this course, I realized that there are so many points and rules in report writing. Prior to this course, I do not think I would have what it takes to write a report or research paper." The student admitted that his academic writing skill was not good. Thus, inferring from the response, it is reasonable to claim that corpus-based instruction assisted the student to identify his academic writing gaps. Besides, some other students thought that while their academic writing skill was moderate, the corpus-based instruction aided them to construct better academic texts. For instance, one student reported that "my academic writing is good but I am not perfect. I think I could write better with the help of this instruction."

Based on the students' response, although few students thought that they had moderate academic writing skills, the majority of students articulated that their academic writing skill was not good enough to produce effective texts and communicate efficiently with their target audience through writing. Participants also stated that corpus-based instruction guided them on how to construct coherent and logically organized academic texts.

The other item focused on evaluating the students' views regarding the importance of corpus-informed activities. Students responded that corpus-informed activities were crucial to write their projects and research reports. One student explained, "in my opinion, the lesson that we learned today was something useful to the tasks we are about to do in the future, like writing a proposal."

The other students also reflected similar ideas regarding learning technical report writing and research methods course through corpus-based instruction. The student reflected that "it was good; I got lots of new ideas….". The other student add that "today's lesson was so important to improve our writing skills and knowledge, and it helped me how to write an abstract, introduction, and other report writing sections" These reflections confirmed that the students got the corpus-based instruction interesting and useful for their current and future academic writing practices.

The third item of the reflective journal aimed at exploring the students' feelings regarding lexical bundles and metadiscourse devices to help them improve their academic writing skills. Accordingly, students indicated that learning lexical bundles and metadiscourse devices helped them improve their academic writing skills. To mention some respondents' reflections:

> *Student (1): "Yes, because lexical bundles and metadiscourse are very useful to write a report, and I gained knowledge about how to use them". Student (4): yes, of course, I think those two contents are very essential to write a good report... Student (8): I think it helped me how to write good abstracts and other types of academic genres.*

The above three sample reflections indicated that using authentic linguistic elements such as lexical bundles and metadiscourse devices would help them improve their academic writing skills. It was also mentioned that contents were helpful to construct academic writing genres such as abstract, introduction, and data interpretation and subgenres such as problem–solution and argumentative essays.

Concerning the students' reflection on their motivation while they were learning the technical report writing and research methods, course, students indicated that they were motivated to attend the academic writing classes. Student (1) addressed that "I want to be a good writer in both formal and informal situations, and I have now a great motivation to learn the theoretical aspects of report writing and practice to develop abstract and introduction sections." The other student also replied, "I am highly motivated to learn the research method course because I am not good at this course, and I want to be a good writer." The other student also indicated that "I am very much interested because the course contains so many new ideas that I did not know. Thus, I am learning it with great care and interest."

These reflections showed that the students developed positive feelings regarding learning the course through corpus-based instruction; they felt that the course

helped them improve their writing skills. During the instruction, students had positive reactions towards the activities. They also put their efforts into understanding and answering the activities. Besides, the students were convinced that it was worth investing their time since the linguistic features helped them to communicate effectively in their current and future academic writing contexts. The students were encouraged to participate in different academic writing activities. They were also motivated, excited, and enjoyed learning the through corpus-informed activities.

The other items focused on the students' behavioral engagement, which refers to the extent to which students actively participate in the given tasks. Accordingly, the students' reflective journal indicated that the students regularly attended in the technical report writing and research methods course, and they were actively involved in drafting, revising, and proofing their essays. Besides, the students responded that they had an active role while discussing activities in pair and group discussions. The reflective journal revealed that the students had positive behavioral engagement while they learned the course through corpus-based instruction.

Let us see some students' responses in their reflective journals. The first item aimed at examining the students' level of participation in the corpus-informed activities which were given during the academic writing instruction. The students responded: student (1) said "While I was learning the course, I participated actively with my partners and in a group discussion. I evaluated my friend's abstract and gave comments when my friends presented the introduction section of their project report." Student (6): Yes, I have participated actively while I was learning course. I drafted my executive summary and revised it based on the comments given." Student (5): "Yes, in this course, all the students have actively participated in the pair and group discussion. During the instruction, we attended carefully and gave comments".

These reflective reports indicated that the students engaged actively in the tasks. They participated to comment on their classmates' essays and paragraphs. The participants also responded that they engaged actively in pair and group discussions. These reflections portrayed that the students were interested in different corpus-informed activities which contributed to improving their behavioral engagement.

The other items focused on the students' roles during classroom discussions. The students reported that they had great engagement and role in initiating the discussion, sharing their understanding, asking about unclear concepts, and other related activities.

> *Student (1): "I asked questions to my classmates when found it difficult to understand how to report and use lexical bundles and metadiscourse devices and I shared with my classmates what I know."*
> *Student (2): "I had different roles. For example, I asked my friends for unclear ideas and I also participated in giving answers.*

Therefore, the students indicated that they had an active role in pair and group discussions and engaged in answering and asking questions. This could not be possible without having positive beliefs about the instruction and the activities incorporated. The students also specified that they had different roles during group discussions and classroom instruction. The respondents indicated that they paid more attention to the activities.

The student's engagement in pair and group discussions, concentration in classroom discussions, and participation in asking and answering questions proved that the students had a behavioral engagement in their academic writing classes. This occurred when the students accepted the lesson as it is worth putting their efforts into the teaching and learning process.

Concerning students' cognitive engagement, participants reflected in their journals that corpus-based instruction initiated them to employ different learning strategies while learning and constructing academic texts. The first item focused on students' efforts which they put to understand the structure and function of lexical bundles and metadiscourse devices.

> *Student (7): I prepared a schedule to study the function and structure of lexical bundles and how to use them while I was writing my project report.*
> *Student (9): As I mentioned before, I found the technical report writing course important for my writing success. Therefore, I attended the lesson during the instruction workout, tasks were given, discussed with my friends, and participated in group discussions.*
> *Student (12): I found lexical bundles and metadiscourse devices interesting. I revised what I learned in my dormitory; sometimes I also searched for ideas from the internet that were clear to me. I also shared what I could understand with my friends.*

The above responses indicated that the students put their efforts to engage in different activities in a classroom and outside the classroom. They engaged in reading, sharing, and presenting activities and reported that they employed different learning strategies to understand how to use lexical bundles and metadiscourse devices in their academic writing classes. These proved that corpus-based instruction improved the students' cognitive engagement.

The other item was aimed at examining the kind of strategies students used while learning academic writing through corpus-based instruction.

> *Student (8) While I was learning technical report writing, I used to ask questions about what I did not understand, and I shared what I knew with our friends.*
> *Student (9): ….The instruction gave me a chance to realize the mistakes that I made while I was writing my project report"*
> *Student (15): "Most of the time we did technical report tasks together with my friends through reading, and we participated by giving ideas.*

The above reflective journal report revealed that the students employed cognitive strategies such as questioning, revising, reading, and critiquing strategies while learning technical report and research writing skills through corpus-based instruction. Besides, the students indicated that corpus-informed activities encouraged them to refer to corpus-based teaching materials, internet resources, concordancing programs, and published articles to understand further how to use lexical bundles and metadiscourse devices.

Based on the students' reflections, it was fair to claim that corpus-based instruction helped them improve their level of engagement. Students had a schedule to do activities before they come to class and to revise what they learned. These proved that corpus-based

instruction encouraged them to spend time on the target activities and employed various learning strategies while they attended academic writing classes.

The data also confirmed that the students were interested and carefully attended the technical report writing and research methods course. The instruction motivated them to engage in academic writing activities through self-regulative and teacher and peer assistance. Additionally, the students' responses affirmed that they invested their time and effort to enhance their academic writing skills. Therefore, it could be said that corpus-based instruction helped mechanical engineering students to improve their behavioral, emotional, and cognitive engagement in their academic writing classes.

Discussion and implications

The purpose of this research was to examine the effects of corpus-based instruction on students' engagement in academic writing classes. The research confirmed that corpus-based instruction had a positive impact on the students' engagement in their academic writing classes. The data obtained from the self-report survey and reflective journal showed that the students who were instructed through corpus-based instruction improved their level of engagement. Recalling the data in Table 2, it was indicated that the students' post-intervention mean was greater than the preintervention mean, which proved that the instruction encouraged students to participate in corpus-informed activities.

In the reflective journal, the students reported that while they were learning their academic writing skills, they engaged in identifying the structure and function of lexical bundles and metadiscourse to revise different academic genres and construct essays. These indicated that corpus-based instruction contributed to excel the students' behavioral, emotional, and cognitive engagement during academic writing instruction.

These findings were concurrent with previous corpus-informed studies. For example, Casan-Pitarch and Calvo-Ferrer (2015 reported that students actively engaged in the classroom during corpus-based instruction. Discipline-related and real-life linguistic features contributed to motivate and to engage in different academic writing activities. The instruction initiated students to immerse them in identifying the contextual usage and structure of lexical bundles and metadiscourse devices. These contribute to improve students' emotional, cognitive, and behavioral engagement when they learn academic writing skills through corpus-based instruction.

Similarly, other researchers such as Huang (2008) also asserted that corpus-based instruction enhanced students' engagement in EFL classes. Belz and Vytakina (2008) explicated that students who engaged in corpus-based instruction were motivated to use certain linguistic elements that occur frequently in their discipline. The instruction helped foreign language teachers to instruct authentic linguistics and enabled them to communicate effectively in their field of study (Lewandowska, 2014; Oveshkova, 2018). It was also revealed that corpus-based instruction attracted students to attempt different academic writing activities and to engage in different pair and group work activities.

Conclusion

In general, this research concludes that continuous exposure to real-life and authentic activities improved students' levels of engagement in academic writing classes. The students' active engagement in the teaching and learning process is the center of academic

writing instruction, and this research indicated that students' emotional, behavioral, and cognitive engagement could be enhanced while they were being instructed through corpus-based instruction.

In this research, the students viewed the corpus-based instruction as relevant to improve their academic writing skills as it used authentic linguistic features essential in their future communicative situations. Thus, the researchers suggest that academic writing teachers and material writers should consider incorporating genuine linguistic features to enhance students' engagement during academic writing instruction.

Author contributions
The authors contributed to data writing, data gathering, interpreting, and proofreading of the manuscript.

Funding
Not applicable.

Availability of data and materials
The collected data were presented and shared.

Declarations

Ethical approval and consent to participate
It is not applicable. However, consent was obtained from data gathering participants.

Competing interests
The authors do not have any competing interest.

Received: 7 April 2023 Accepted: 8 November 2023
Published online: 04 March 2024

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