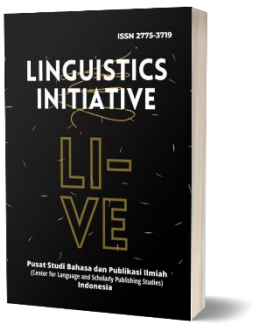

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Trending Technologies: A Corpus-based Genre Analysis of Abstracts on ChatGPT

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Abstract
Genre studies have dominated academic contexts, with a particular focus on research article abstracts. Such studies have focused on single and cross-discipline discourse practices, rather than how different disciplines address a common subject based on its communicative purpose. Against this backdrop, this study conducted a corpus-based genre analysis of RA abstracts on ChatGPT. Synergising ESP textual analysis, and corpus-based analysis, the study analysed 72 abstracts. The analyses revealed the 'Product' and 'Purpose' moves were the most frequent in the abstracts. The 'Product' move was afforded much textual space. Concerning the lexicogrammatical features, *chatgpt* was typified in all the abstracts occurring frequently at the 'Introduction' and 'Purpose' moves. Furthermore, the potential and use of ChatGPT, as well as its educational implications, were themes developed from the lexicogrammatical characteristics. Based on these findings, the study provides recommendations for practice and further research.

Keywords
abstracts, ChatGPT, corpus, ESP, technologies

Introduction

Research article (hereafter, RA) abstracts have been conceptualised as a genre and received considerable attention from researchers over the past four decades (Bhatia, 2004; Hyland, 2004; Swales, 1990). Hyland (2004) describes abstracts as a "selective representation" (p. 64) of the complete content of an article. It is a reproduction of related texts (Bazerman, 1984). The abstract convinces the reader that the text is worth reading (Hyland, 2000). Bhatia (1993, p. 78) intended the abstract "as a description or factual summary of a longer report, designed to give the reader an accurate and concise understanding of the entire text". Saidi and Talebi (2021) claim that abstracts determine the fate of scientific papers. This means that the acceptance, rejection, or assumed motivation of RA depends largely on the abstract (Huckin, 2001; Ren and Li, 2011). Bhatia (1993) noted that RA abstracts have a mutual communicative purpose which requires disciplinary knowledge within a discourse community. As such, abstracts play a critical role in attracting readers, guiding their expectations, and conveying the relevance and contribution of the research.

RA abstracts have been extensively researched (Bhatia, 2003; Hyland, 2000; Pho, 2008; Tseng, 2011) in several disciplines. Most existing studies are in the disciplines of tourism (Ahmed, 2015), law (Ghasempour & Farnia, 2017), marketing (Li & Pramoolsook, 2015), medicine (Fryer, 2012), applied linguistics (Agbaglo & Fiadzomor, 2021; Darabad, 2016; Hu & Cao, 2011), and across disciplines (Bhatti et al., 2019; Hu & Liu, 2018). The seminal study by Swales (1990) called for attention to RA abstracts. Swales and Feak (2000) presented a comprehensive analysis of RA abstracts' rhetorical features. They identified a common four-move structure and conspicuous linguistic features used to indicate the method, findings, and claims of research. Similarly, Adel and Schleppegrell's (2009) cross-sectional study in hard science disciplines identified disciplinary variations related to the inclusion of hypotheses and discussions in the abstracts. Motivated by the linguistic features of abstracts, Salager-Meyer (1992) identified a dominant use of the present tense in the purpose and method sections of abstracts while modal verbs were used to express probability and obligation. Innovatively, Xu and Guo (2018) reported disciplinary variations in the structure of the move and the use of authorial stances, such as hedging and self-mention, to establish the author's credibility and convey research claims.

An understanding of the topic also includes a genre analysis of studies on digital technologies. There has been a growing interest in applying genre analysis to digital technologies. Scholars have explored various genres that are used in digital contexts, including social media posts (Arola & Wysocki, 2011; Chen & Xu, 2017), emails (Warschauer & Gonzalez, 2006), blogs (Miller & Shepherd, 2004), and online reviews (Hsiao & Wu, 2014; Kim & Lee, 2017). These studies have provided information on how digital genres are constructed and used, as well as their impact on communication. One of the first studies on digital genres was conducted by Miller and Shepherd (2004), who analysed the genre of blogs. They found that blogs are characterized by their conversational style, informal language, and personal voice. Another genre that has been extensively studied in the digital context is social media posts. Chen and Xu (2017) examined the genre of Weibo posts in China, a microblogging platform similar to Twitter.

They found that Weibo posts are characterised by their short length, frequent use of emoticons and hashtags, and the presence of multimedia elements such as images and videos. Emails have also been the subject of several genre analysis studies, such as Yates and Orlikowski (2002), who analysed the genre of work emails and found that they are highly structured and follow a set of conventions, AlAfnan (2017), who analysed which expert members construct and exploit emails, and Mehrpour and Mehrzad (2013) comparative genre analysis of business emails.

These studies focus on investigating the rhetorical patterns, linguistic features, and communicative functions of digital genres and RA abstracts in different disciplines. In the present study, we examine RA abstracts on ChatGPT. We acknowledge that ChatGPT is not a discipline that has a discourse of practice, however, its communicative purpose has attracted considerable attention from scholars from different disciplines (Pavlik, 2023; Gilson et al., 2023; Rudolph et al., 2023). OpenAI's Chat Generation Pretrained Transformer (ChatGPT) has 175 billion parameters and is part of a cascade of natural language processing (NLP) models designed to enable computers to interact with human speech (Hosseini et al., 2023). ChatGPT generates multiple conversational responses based on user input. Its conversational design in answering multiple topics from different domains and industries makes it a useful tool (Gilson et al., 2023). The academic community began to worry about the credibility, acceptability, and relevance of ChatGPT. Operationalising it as a digital genre (such as emails and web blogs), we do not focus on how various genres are used in its digital context, but on how RA abstracts are used to communicate about ChatGPT. The currency and extensive production of RAs on the topic merits a genre analysis to reveal the rhetorical structure of the RA abstracts on the subject. The main rationale is that the present study could enhance our understanding of the trend of research on ChatGPT, language and communication practices that shape the production and reception of academic research on this current topic. Additionally, we point out the critical lexicogrammatical aspects that typify the focus of research on ChatGPT. Thus, the traditional genre analysis approach could benefit from the advantages of corpus-based analysis in exploring the linguistic features of the abstracts. Based on these rationales, our study is guided by two main research questions:

1. What is the move structure of the RA abstracts published on the ChatGPT topic?

2. What themes do the lexicogrammatical features reveal about the RA abstracts published on the ChatGPT topic?

ESP Approach to Genre Studies

The ESP approach to genre analysis is the central focus of this section. Initially, genre scholarship was populated with three traditional approaches: New Rhetoric, Systemic Functional Linguistics, and English for Specific Purposes The evolution of genres required the development of other approaches such as Cognitive Genre Analysis, Critical Genre Analysis, and Corpus-based Genre Analysis (Lin et al., 2020). Among these approaches, we adopt the ESP approach to genre analysis considering the rationale of the study. Swales (1990) is acknowledged for introducing the ESP approach to genre analysis.

Swales (1990) defines a genre as a class of communicative events that are purposefully structured to share a common purpose through patterned structures, styles, content, and intended audience. The purpose of communication is commonly shared by members of the professional or academic discourse community. ESP studies have expanded beyond simply describing lexicogrammatical features to also include communicative purposes and effects.

Swales (1990) explains that this has increased the interest in evaluating the rhetorical purposes of genres and considering their structure and linguistic features. A key concept in the rhetorical structure of a genre is the 'move', which indicates the communicative purpose that motivates and shapes the genre (Bonsu & Afful, 2022; Hu & Liu, 2018). A move is a purposeful sub-rhetorical unit of a genre that aids in realizing the genre's communicative purpose (Swales, 1990). Although the concept of 'move' appears abstract, it is identified by its communicative purpose (Bonsu & Afful, 2022), cognitive-semantic boundaries, or the structure of the text (Tseng, 2011). Another concept is 'step', a rhetorical strategy embedded in a move. Collectively, these concepts contribute to realising and achieving the purpose of a genre. Aside from the rhetorical structure, lexicogrammatical resources contribute to understanding a genre through the different use of language (Bhatia, 1993, 2002). Exploring the lexicogrammatical features of a genre reveals thematic issues that are overlooked in the rhetorical structure analysis (Bhatia, 1996). While the lexicogrammatical resources have been explored from a textual analytical perspective in ESP, recent studies (Dong & Lu, 2020; Goźdź-Roszkowski, 2020; Hüttner et al., 2009) are proposing and applying corpus-based analysis to reveal the key intricacies associated with genres.

Method

Research Approach

Empirical studies on genre analysis of RA abstracts employ a variety of linguistic and textual approaches to investigate the communicative functions and patterns of abstracts across different academic disciplines and research genres. The textual analysis approach has dominated most studies (Bonsu, 2021; Hyland, 2000; Pho, 2008; Saidi & Talebi, 2021; Tseng, 2011). By examining conventions and variations in abstracts, these studies shed light on how scholars use language to convey scientific knowledge, construct research identities, and negotiate disciplinary norms and expectations. We adopted the textual analysis approach to explore, understand, and answer research question one (move structure of the abstracts). We supplemented the textual analysis with a corpus-based approach to answer the second research question, based on the frequent lexicogrammatical words and their concordances. Biber et al. (1994) reiterated the benefits of the corpus approach to ESP research. Thus, corpus analysis foregrounds the linguistic resources that are hidden in traditional textual analysis procedures.

Data Collection

Initially, we obtained 293 abstracts including preprints, opinion-based articles, editorial letters and messages, empirical RA abstracts and blog abstracts. We sifted the data by

delimiting the time frame from December 2022 to January 2023. We then excluded all abstracts that were not from empirical studies. Further screening of the abstracts revealed that some are in-print publications, but was, however, excluded from the data. Finally, the data comprised 72 empirical RA abstracts extracted from different publishers and journals such as Emerald, Springer, Taylor and Francis, Ed-Tech Reviews, Elsevier, and Lancet. These publishers are noted for their credibility, rigorous review and publications, and influence of citations in the academic discourse community. Given the currency of the topic, RA abstracts published between January to March 2023 were considered. We ensured that the data for the study were suitable for the study since they are adequate to reach saturation and prevent possible redundancy (Fusch & Ness, 2015).

Data Analysis

Several analytical models have been proposed to analyse RA abstracts: Create a Research Space (CARS) model and Introduction-Method-Results-Discussion (IMRD) framework by Swales (1990, 2004); Hyland's (2000) five-move model; Bhatia's (1993) four-move classification; and Santos's (1996) five-move model. Of these analytical models, Hyland's (2000) IPMPrC has been extensively applied in several studies (Bonsu, 2021; Bonsu & Afful, 2022; Darabad, 2016; El-Daks, 2018; Saidi & Talebi, 2021) due to its comprehensiveness. As such, we adopted Hyland's model to analyse the abstracts. Concerning the research questions, the analysis of the move structure focused on the frequency, sequencing, and textual space of the moves. We used the cognitive-semantic boundary to identify the moves. Given that the abstracts were not categorised into disciplines, we labelled them as 'AB'. We created a table to facilitate the identification and labelling of the moves in the abstracts. We calculated and achieved an acceptable level of interrater reliability of 90%. Some hindrances in the analysis procedure were resolved through discussions. We used Hüttner's (2010) criteria to determine the status of the moves (see Table 1).

Table 1. *Hüttner's Criteria for Determining the Status of Moves*

Percentage of Occurrence	Status
90% - 100%	Obligatory
50% - 89%	Core
30% - 49%	Ambiguous
1% - 29%	Optional

After the move analysis was complete, we conducted a corpus-based analysis of the lexicogrammatical features related to each move. First, we converted the document files (.doc) to plain text files (.txt), which were machine-readable by AntConc. We generated the wordlists and used the first 10 content words to trace their concordance (see Figures 2 to 6). The lexicogrammatical resources focused on revealing the first 10 content items based on their frequency and ranking (see Table 5). Through the content words, we formulated themes derived from the abstracts on ChatGPT.

Results and Discussion

Move Structure and Frequency of the Moves

Five moves were identified in the abstracts. These moves, according to Hyland's (2000) model typify RA abstracts. The moves, their labels, and their purposes are provided in Table 2. Given the relative restriction of space, further analysis of the steps was excluded from the study.

***Table 2**. Identification and Labelling of Moves in the Abstracts*

Moves	Label	Purpose
Move 1	Introduction	It establishes the background of the paper and the need for the research
Move 2	Purpose	It indicates the purposes, objectives, or hypotheses of the research
Move 3	Methodology	It provides information on the research design, approach, data, etc.
Move 4	Product	It states or establishes the findings, results, or what was achieved in the investigation.
Move 5	Conclusion	It interprets and extends the results of the study by drawing inferences and pointing out the implications of the research

All five moves were identified in the abstracts, giving us a five-move structure (Introduction-Purpose-Methodology-Product-Conclusion). Several studies reported similar results (Bonsu & Afful, 2022; Hyland, 2000; Saidi & Talebi, 2021). The frequency of each move is presented in Table 3. Each of the moves is discussed in the ensuing sub-section and supported with extracts. Move 2 and 4 were the most frequent moves with 97.22% occurrence in the abstracts, Moves 1, 3, and 4 were core moves with 89.04%, 81.94%, and 73.61% occurrence in the abstracts, respectively. Moves 2 and 4 are obligatory and exemplars of the abstracts on ChatGPT. Thus, such empirical RA abstracts would be flawed with these moves. We affirm that any RA abstract on ChatGPT should have the purpose and findings of the research. The core moves, as iterated by Hüttner (2010), are only typical of the abstracts on ChatGPT and contribute to their RAs' acceptance of the topic.

***Table 3**. Frequency of Moves*

Move	Frequency (Percentage)	Status of Move
M1: Introduction	65 (89.04%)	Core
M2: Purpose	70 (97.22%)	Obligatory
M3: Methodology	59 (81.94%)	Core
M4: Product	70 (97.22%)	Obligatory
M5: Conclusion	53 (73.61%)	Core

Move 1: Introduction

Move 1 is the *introduction*. This move establishes the context of the research. It points out the issues related to the field that motivates the conduct of the research. This move was core with an 89.04% occurrence in the entire data. Although the introduction move is core, most authors include the introduction in their studies (Behnam & Zamanian, 2013) to signify the tendency to contextualise their study before the purpose statement. The results are consistent with the findings by Bonsu and Afful (2022) and Skelton (1994). Extract 1 illustrates the moves.

Extract 1

a. Recently, ChatGPT has attracted great attention, as it can generate fluent and high-quality responses to human inquiries. Several prior studies have shown that ChatGPT attains remarkable generation ability compared with existing models. However, the quantitative analysis of ChatGPT's understanding ability has been given little attention. (AB1)

b. The emergence of generative AI technologies, such as OpenAI's ChatGPT chatbot, has expanded the scope of tasks that AI tools can accomplish and enabled AI-generated creative content. (AB7)

In Extracts 1a and 1b, the researchers stated the currency of the topic and how it has attracted enormous concerns. Extract 1a follows reviewing previous studies indicating a gap in the research. Thus, it is typical for RA abstracts to have an introduction to orient the reader to the topic. This is evident in the clusters *Recently, ChatGPT has attracted great attention…* and *The emergence of generative AI technologies…*

Move 2: Purpose

The *Purpose* move provides the intention of the research and what it aims to achieve. The purpose move achieved a 97.22% occurrence in the abstract, making it obligatory. Thus, this move is exemplary of RA abstracts on ChatGPT. Illustrations are provided in Extract 2.

Extract 2

a. This study aims to explore the potential of artificial intelligence, particularly natural language processing, in enhancing academic performance using economics and finance. (AB70)

b. This research paper seeks to investigate the cyber risks associated with the use of ChatGPT and other similar AI-based chatbots, including potential vulnerabilities that could be exploited by malicious actors. (AB45)

Saidi and Talebi (2021) presented two forms of stating the purpose of the abstract: the purposive form and the descriptive form. The purposive forms use expressions such as 'the purpose of', 'the aim of', 'the intention of' and among others. The descriptive forms discuss the objectives directly using the present forms of citation verbs such as 'we investigate', 'the research explores', 'the study examines', and among others. In the present study, the purpose move was stated with to-infinitive verbs (such as *to investigate*

and *to explore*). Generally, studies on RA abstracts have confirmed the obligatoriness of the purpose move (Hyland, 2000; Van Bonn & Swales, 2007).

Move 3: Methodology

Move 3 provides information about the research design, approach, data, analysis procedures, and ethical considerations. This move was core with an 81.94% occurrence in the abstracts. It is rather surprising that some of the empirical RA abstracts did not include the methodological procedures adopted for their research on ChatGPT. This could be due to how the topic was addressed by the authors. Extract 3 provides examples of this move.

Extract 3

a. This paper includes an interview with ChatGPT on its potential impact on academia and libraries. The interview discusses the benefits of ChatGPT such as improving search and discovery, reference, and information services; cataloguing and metadata generation; and content creation, as well as the ethical considerations that need to be taken into account, such as privacy and bias. (AB38)

b. The study employs a case study approach, using ChatGPT as a specific example of an NLP tool that has the potential to advance research. (AB10)

Extracts 3a and 3b illustrate the *Methodology* move. In Extract 3a, the data collection procedure and ethical considerations were presented. Extract 3b stated the research approach of the study. Given the brief discussion of the method move, it is difficult to grasp the thrust of the RAs on ChatGPT. The results contrast previous studies that identified the method move as obligatory (Abdollahpour & Gholami, 2018; Fryer, 2012).

Move 4: Product

Move 4 achieved a 97.2% occurrence in the abstracts. It achieved an obligatory status. Conventionally, Move 4 is termed as 'Results' in other studies (Fryer, 2012; Swales, 1990; Swales & Feak, 2004). It reports the findings or achievements of the research. That is, empirical RAs are required to report the findings of the research. Examples are provided in Extract 4.

Extract 4

a. We find that: 1) ChatGPT falls short in handling paraphrase and similarity tasks; 2) ChatGPT outperforms all BERT models on inference tasks by a large margin; 3) ChatGPT achieves comparable performance compared with BERT on sentiment analysis and question-answering tasks. (AB61)

b. Benefits of ChatGPT include but are not limited to promotion of personalized and interactive learning, formative assessment practices etc. (AB53)

The *Product* move could present expected or otherwise results from empirical studies. According to Bonsu and Afful (2022), without the product move, RAs will not be complete. For example, Extract 3a states the benefits of ChatGPT after the analysis. We liaise the

obligatoriness of the product move to the purpose and establish that the product move confirms or denies the achievement of the purpose of the research. Darabad (2016) and Imsa-ard (2021) confirmed the cruciality of the purpose move in RA abstracts.

Move 5: Conclusion

The *Conclusion* move had the least frequency of occurrence in the abstracts (73.61%), achieving a core status. The move finalises the study by providing recommendations for research, implications for practice, and drawing inferences. Examples are provided in Extract 5.

> Extract 5
>
> a. We believe that our findings may give light on future efforts to determine and mitigate the ethical hazards posed by machines in LLM applications. (AB32)
>
> b. The study offers recommendations on how ChatGPT could be leveraged to maximize teaching and learning. Policy makers, researchers, educators and technology experts could work together and start conversations on how these evolving generative AI tools could be used safely and constructively to improve education and support students' learning. (AB5)

Contrasting other studies (Alhuqbani, 2013; Zanina, 2017) that reported this move to be optional in abstracts, its core status in this research signifies the relevance of drawing inferences and providing recommendations for the use, rejection or regulation of ChatGPT in education (see Extract 5b). The ethical aspects of ChatGPT are also considered in Extract 5a. In this regard, it becomes necessary for authors researching ChatGPT to conclude their abstracts, which summarise their recommendations or implications in the main text.

Sequencing of the Moves

The sequencing of the moves was calculated based on the most significant ones. The less frequent sequences were categorised as one while the frequent ones were analysed independently. Figure 1 presents a representation of the move sequence and their respective frequencies in the abstracts.

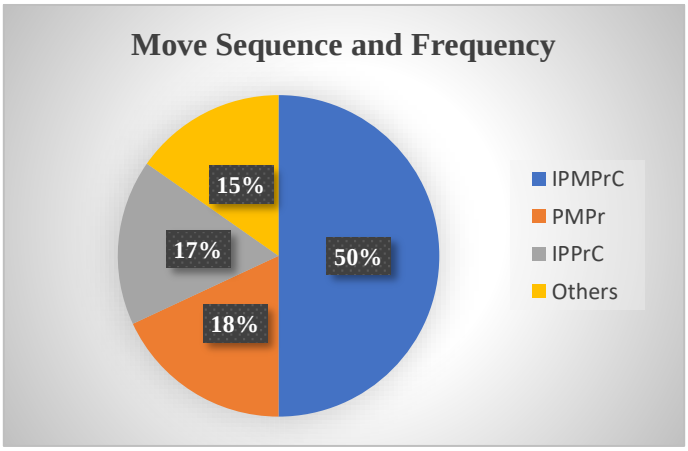


Figure 1. *Move Sequence and Frequency*

In Figure 1, the most frequent move sequence was the five-move sequence, IPMPrC, with a 50% occurrence. That is, half of the abstracts (36) contained the *introduction*, *purpose*, *method*, *product*, and *conclusion*. A three-move sequence, PMPr, had the second highest frequency. The four-move sequence, IPPrC, and other sequences such as PPr and IPrC, were the third and fourth most frequent sequences with 17% and 15% occurrence, respectively. Through these sequences, we affirm that various authors used discursive practices peculiar to their disciplines to investigate the ChatGPT subject. The co-occurrence of the *Product* and *Purpose* moves reaffirms their obligatory and important status in the abstracts. Aside from the IPrP move sequence which was non-linear, all the moves exhibited linearity (Swales, 1990).

Textual Space of the Moves

The textual space was calculated based on the number of words in each move. The average number of words for a single move in an abstract was determined by dividing the total textual space by the frequency of move occurrence. In genre studies, the textual space afforded to a move indicates its significance in the genre. The results are presented in Table 4.

Table 4. Textual Space of Moves

Move	Textual Space per Move	Average Number of Words per Move
M1: Introduction	4607 (27.67%)	4607/65 = 70.87
M2: Purpose	2319 (13.93%)	2319/70 = 33.12
M3: methodology	2599 (15.61%)	2599/59 = 44.05
M4: Product	5472 (32.87%)	5472/70 = 78.17
M5: Conclusion	1651 (9.92%)	1651/53 = 31.15
Total	**16648 (100%)**	**257.36**

From Table 4, the most frequent move, Move 2 (Purpose) had the second least textual space, averaging 33.12 words per instance in a move, and Move 4 (Product) had the highest textual space, averaging 78.17 words per move instance. This means that the authors gave much significance to discuss their findings and what the study achieved. Additionally, given the novelty of the research on the topic, much information is needed to guide other studies. This explanation is connected to the second-highest textual space afforded to the *Introduction* move, averaging 70.87 words per move instance. However, the brevity of the Purpose move could be attributed to its succinct statement. The least textual space was afforded to the *Conclusion* move. Similar findings were reported by Bonsu and Afful (2022), Chen (2010), and Djuwari (2012). Per the total average number of words (that is, 257.36), it is a little above the required abstract limit for most journals. That is, conventionally, abstracts should comprise 150 to 250 words, with a few innovative journals allowing a 300-word limit. The word limit of an abstract corroborates the relative importance it receives (Samraj, 2002).

Lexicogrammatical Features

Frequency and Concordance of Content Words and Related Themes

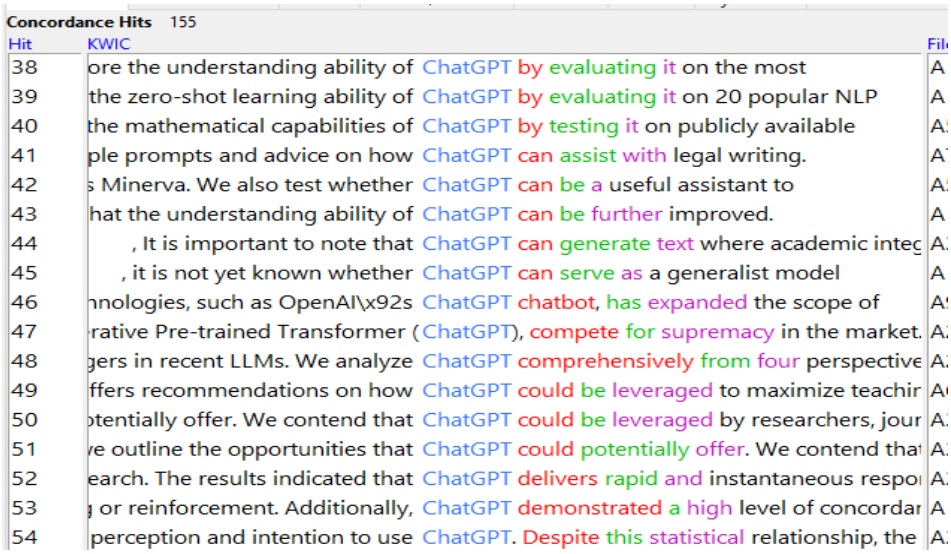
The ten frequent words used across the abstracts are presented in Table 5. We conceive these words to entail the aboutness of the abstracts and the topic addressed. Considering that the topic of discussion is ChatGPT, it is not surprising that the word was the most frequent among the 10 words. The words in Table 5 were sorted and grouped into two main themes that were derived from the abstracts.

Table 5. *Ten Frequent Content Words*

Rank	Frequency	Word
5	310	chatgpt
19	72	language
24	56	research
25	54	learning
26	54	use
30	50	intelligence
31	50	students
34	46	education
72	24	content
73	24	ethical

ChatGPT: Usage and Potential

Concerning this theme, the abstracts, which are summaries of the RAs, pointed out the use and potential of ChatGPT and other related AI software. The words that form part of this theme are *chatgpt*, *language*, *intelligence*, and *use*. These words share meaning and foreground the use and potential application of ChatGPT in several fields. Figures 2 and 3 present examples of the concordance of 'chatgpt' and 'language' in the abstracts.



Concordance Hits 155

Hit	KWIC	Fil
38	ore the understanding ability of ChatGPT by evaluating it on the most	A
39	the zero-shot learning ability of ChatGPT by evaluating it on 20 popular NLP	A
40	the mathematical capabilities of ChatGPT by testing it on publicly available	A
41	ple prompts and advice on how ChatGPT can assist with legal writing.	A
42	s Minerva. We also test whether ChatGPT can be a useful assistant to	A
43	hat the understanding ability of ChatGPT can be further improved.	A
44	, It is important to note that ChatGPT can generate text where academic integ	A
45	, it is not yet known whether ChatGPT can serve as a generalist model	A
46	nologies, such as OpenAI\x92s ChatGPT chatbot, has expanded the scope of	A
47	rative Pre-trained Transformer (ChatGPT), compete for supremacy in the market.	A
48	gers in recent LLMs. We analyze ChatGPT comprehensively from four perspective	A
49	ffers recommendations on how ChatGPT could be leveraged to maximize teachir	A
50	otentially offer. We contend that ChatGPT could be leveraged by researchers, jour	A
51	e outline the opportunities that ChatGPT could potentially offer. We contend that	A
52	earch. The results indicated that ChatGPT delivers rapid and instantaneous respo	A
53	or reinforcement. Additionally, ChatGPT demonstrated a high level of concordar	A
54	perception and intention to use ChatGPT. Despite this statistical relationship, the	A

Figure 2. *Concordance of chatgpt*

From Figure 2, with a concordance hit of 155, *chatgpt* was the highest frequent content word in the abstracts. The words that co-occur with it indicate its potential and uses. For example, line 44 states that "… ChatGPT can generate text…", line 41 "… ChatGPT can assist with legal writing", lines 49 and 50 "… ChatGPT could be leveraged to maximise teaching" and "ChatGPT could be leveraged by researchers…". Line 53 reveals that "ChatGPT delivers rapid and instantaneous responses". These pieces of evidence support the themes formulated in this section. The *intelligence* and *use* content words concern the development and application of artificial 'intelligence' in several industries.

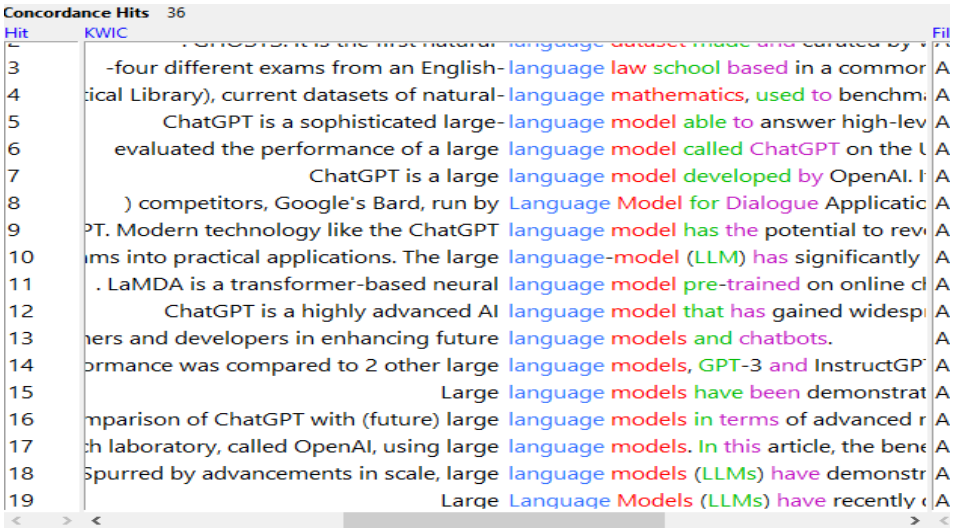
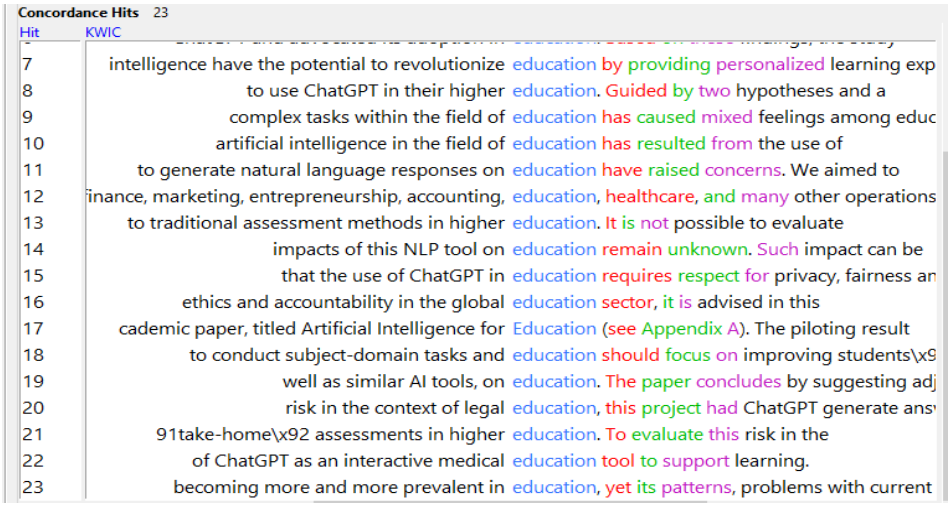


***Figure 3**. Concordance for language*

The concordance for *language* is dominantly related to the model that ChatGPT runs on, that is large-language model(s), as evident throughout the lines. To cite, Anson and Straune (2022) supported language models of AI such as ChatGPT and recommended that educators guide the learning of students through such models. It is this model that allows AI to communicate and interact with inputs. This is supported by other words in Figure 3 such as 'chatbot', 'dialogue', and 'answer'. There exists a large body of literature (Pavlik, 2023; Tlili et al., 2023) supporting the potential and use of ChatGPT in academic and nonacademic contexts.

Educational Implications of ChatGPT

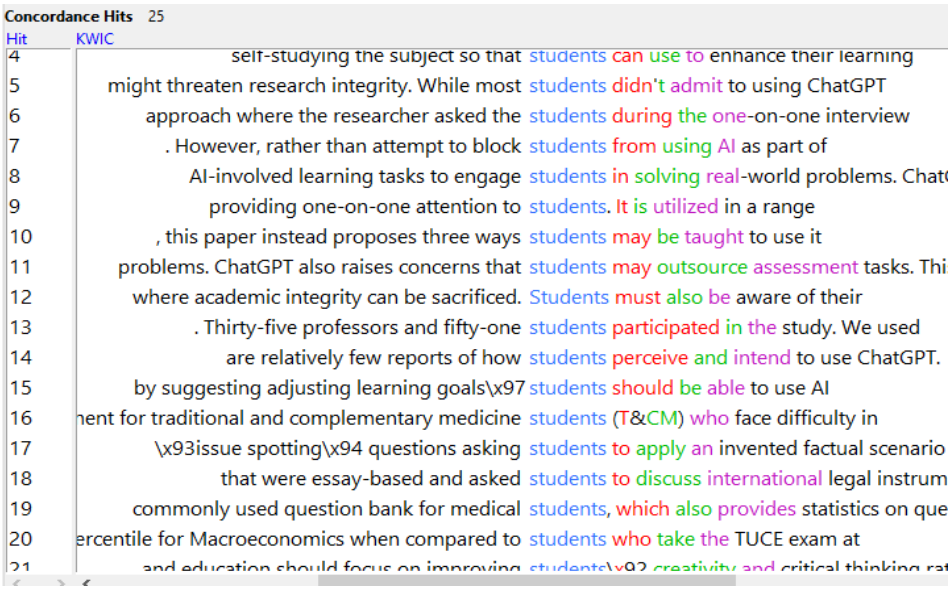
Learning, *education*, *students*, *research*, *content*, and *ethical* form the educational implications of ChatGPT theme. That is, the RAs were heavily concerned with how ChatGPT influences the educational goals and learning outcomes of students. In addition to the numerous studies testing the reliability of ChatGPT, other critical concerns have come from educational or academic contexts. This confirms why more content words are related to this theme. Figures 4, 5, and 6 exemplify the concordances for further discussion.



Concordance Hits 23

Hit	KWIC
7	intelligence have the potential to revolutionize education by providing personalized learning exp
8	to use ChatGPT in their higher education. Guided by two hypotheses and a
9	complex tasks within the field of education has caused mixed feelings among educ
10	artificial intelligence in the field of education has resulted from the use of
11	to generate natural language responses on education have raised concerns. We aimed to
12	finance, marketing, entrepreneurship, accounting, education, healthcare, and many other operations
13	to traditional assessment methods in higher education. It is not possible to evaluate
14	impacts of this NLP tool on education remain unknown. Such impact can be
15	that the use of ChatGPT in education requires respect for privacy, fairness an
16	ethics and accountability in the global education sector, it is advised in this
17	cademic paper, titled Artificial Intelligence for Education (see Appendix A). The piloting result
18	to conduct subject-domain tasks and education should focus on improving students\x9
19	well as similar AI tools, on education. The paper concludes by suggesting adj
20	risk in the context of legal education, this project had ChatGPT generate ans
21	91take-home\x92 assessments in higher education. To evaluate this risk in the
22	of ChatGPT as an interactive medical education tool to support learning.
23	becoming more and more prevalent in education, yet its patterns, problems with current

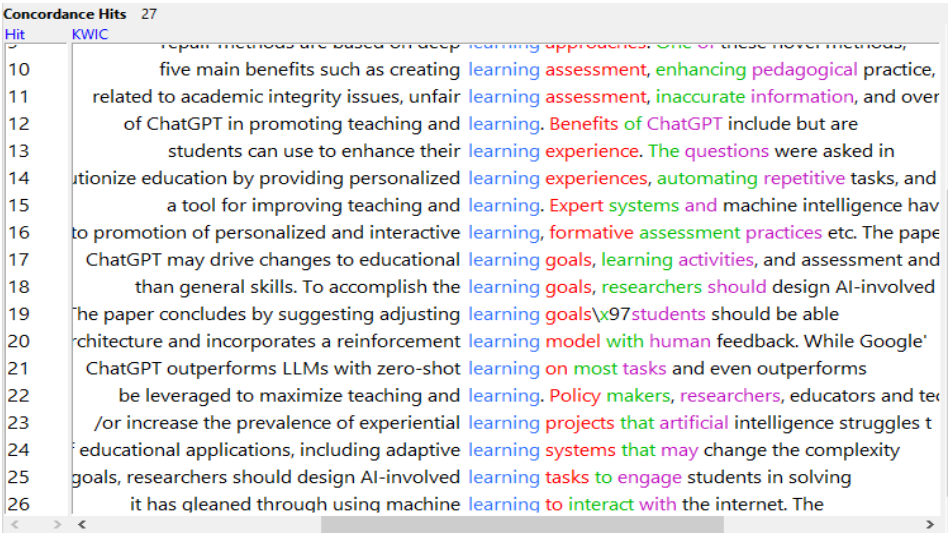
Figure 4. *Concordance for education*



Concordance Hits 25

Hit	KWIC
4	self-studying the subject so that students can use to enhance their learning
5	might threaten research integrity. While most students didn't admit to using ChatGPT
6	approach where the researcher asked the students during the one-on-one interview
7	. However, rather than attempt to block students from using AI as part of
8	AI-involved learning tasks to engage students in solving real-world problems. Chat
9	providing one-on-one attention to students. It is utilized in a range
10	, this paper instead proposes three ways students may be taught to use it
11	problems. ChatGPT also raises concerns that students may outsource assessment tasks. Thi
12	where academic integrity can be sacrificed. Students must also be aware of their
13	. Thirty-five professors and fifty-one students participated in the study. We used
14	are relatively few reports of how students perceive and intend to use ChatGPT.
15	by suggesting adjusting learning goals\x97 students should be able to use AI
16	nent for traditional and complementary medicine students (T&CM) who face difficulty in
17	\x93issue spotting\x94 questions asking students to apply an invented factual scenario
18	that were essay-based and asked students to discuss international legal instrum
19	commonly used question bank for medical students, which also provides statistics on que
20	ercentile for Macroeconomics when compared to students who take the TUCE exam at
21	and education should focus on improving students\x92 creativity and critical thinking rat

Figure 5. *Concordance for students*



Concordance Hits 27

Hit	KWIC
10	five main benefits such as creating learning assessment, enhancing pedagogical practice,
11	related to academic integrity issues, unfair learning assessment, inaccurate information, and over
12	of ChatGPT in promoting teaching and learning. Benefits of ChatGPT include but are
13	students can use to enhance their learning experience. The questions were asked in
14	tionize education by providing personalized learning experiences, automating repetitive tasks, and
15	a tool for improving teaching and learning. Expert systems and machine intelligence hav
16	to promotion of personalized and interactive learning, formative assessment practices etc. The pape
17	ChatGPT may drive changes to educational learning goals, learning activities, and assessment and
18	than general skills. To accomplish the learning goals, researchers should design AI-involved
19	The paper concludes by suggesting adjusting learning goals\x97students should be able
20	rchitecture and incorporates a reinforcement learning model with human feedback. While Google'
21	ChatGPT outperforms LLMs with zero-shot learning on most tasks and even outperforms
22	be leveraged to maximize teaching and learning. Policy makers, researchers, educators and te
23	/or increase the prevalence of experiential learning projects that artificial intelligence struggles t
24	educational applications, including adaptive learning systems that may change the complexity
25	goals, researchers should design AI-involved learning tasks to engage students in solving
26	it has gleaned through using machine learning to interact with the internet. The

Figure 6. *Concordance for Learning*

The implications of ChatGPT for education are related to revolutionalizing learning (Figure 4; Lines 7, 14, and 22), its presence and risk (Figure 4; Lines 23, 13, 9) and ethical consideration (Figure 4; Lines 16, 15; Figure 6; Lines 11). A critical look at the concordance for students (see Figure 5) shows that they are the actual end-users of the software. The implications of ChatGPT for students are increasing their performance, solving real-life problems, and promoting and enhancing their learning. Rudolph et al (2023) presented the fantastic pedagogical capabilities of ChatGPT. In line 7, the concordance advocates that students should be allowed to use AI, while line 12 points to students being aware of the privacy and ethical issues concerning its use. In Figure 6, the concordance hits of 27 direct the study to ascertain that ChatGPT is gaining consideration in aiding educators to accomplish learning goals and promoting teaching and learning (Pavlik, 2023). The abstracts presented ChatGPT as an "education tool to support learning" (Figure 4; Line 22). Despite these benefits, we support Hu's (2023) assertion that ChatGPT poses hidden challenges to gatekeepers in maintaining standards and ensuring ethical practices in academia. Conclusively, the corpus analysis revealed that the subjects of the RA abstracts on ChatGPT concern ChatGPT and its educational implications for students and learning.

Conclusion and Implications

This study was designed to conduct a corpus-based genre analysis of empirical RA abstracts published in ChatGPT. Rather than the conventional exploration of RA abstracts which are discipline-specific, the study explored RA abstracts addressing a specific topic. This study innovatively combined ESP textual analysis and corpus-based analysis to answer the research questions. The study revealed that the most frequent and obligatory moves were the 'Purpose' and 'Product' moves. A single move sequence (that is, IPMPRC) was significantly more frequent than other sequences in the abstracts. The 'Product' move was allocated much textual space, establishing its relevance in the abstracts. Concerning the lexicogrammatical features, *chatgpt* was typical of all the abstracts, occurring mostly at the Introduction and Product moves. The ten word lists in the abstracts related to two main themes: ChatGPT: potential and usage; and educational implications of ChatGPT.

Several implications can be drawn from the findings of this study. First, given the close resemblance of ChatGPT to hard and soft science, another study could investigate how RA abstracts in specific discipline journals construct their research on the topic. The specificity of the topic could be broadened to incorporate other related AI programmes. Additionally, the study could focus on other subgenres of the RAs such as literature review, methodology, or conclusion. Second, a more comprehensive study could incorporate preprints and other RA other than empirical for more rigorous results. Pedagogically, non-native educators should devise a means to guide the language use of learners by delimiting their use of ChatGPT. Also, educational stakeholders could strategise and regulate the use of ChatGPT among students. This could support the rhetorical writing of students based on the conversations generated by ChatGPT.

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Data Availability

The data for the research is available on request, through the email address of the corresponding author (ebonsu@stu.ucc.edu.gh).