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Research Paper

The Role of ChatGPT-based Instruction and Flipped Language Learning in Metadiscourse Use in EFL Learners' Argumentative Writing and their Perceptions of the two Instructional Methods

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Abstract

The advent of ChatGPT, an all-purpose intelligent Chabot created by Open AI, has created a multitude of prospects and opportunities within the realm of language education. Owing to its exceptional capacity to produce a wide range of textual outputs, ChatGPT responds to queries in a matter of seconds. The present study aimed to examine the appropriateness of ChatGPT-based instruction and flipped language learning instruction (FLLI) in classrooms in terms of enhancing EFL learners' interactional metadiscourse realization across language proficiency levels. Sixty-three English language learners were divided into four distinct groups: 16 in the advanced and 16 in the intermediate FLLI group, 15 in the advanced, and 16 in the intermediate ChatGPT group. Before initiating the study, all participants were given a pretest that specifically assessed the use of interactional metadiscourse markers (IMMs) in argumentative writing. The four experimental groups were separately exposed to ChatGPT-based instruction and FLLI during eight sessions. Results from a two-way analysis of variance (ANOVA) procedure through SPSS (version 25) revealed that the ChatGPT-based instruction was more effective than FLLI, and both intermediate and advanced language learners following the ChatGPT-based instruction used IMMs in argumentative writing more successfully. Moreover, the participants' perceptions of ChatGPT and FLLI were analyzed through MAXQDA (version 2020), showing more positive attitudes towards using ChatGPT in language learning in general and IM realization in particular. The findings have the potential to provide advantages for teacher educators in terms of utilizing ChatGPT learning approaches.

Keywords: ChatGPT-based Instruction, Flipped Language Learning Instruction, Interactional Metadiscourse

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Metadiscourse is a sophisticated concept that has undergone thorough examination; however, it is short of a particular theoretical basis presenting a unified definition. IM is considered to be a resource indicating a subordinate level of meaning of a text. That is, it does not carry the propositional meaning of a text (Ho & Li, 2018). Metadiscourse enables writers to employ the three modes of persuasion, including logos, ethos, and pathos, as proposed by Aristotle (Lawson-Tancred, 2020). As a result, there is a noticeable absence of standardized and rigorous research methodologies in empirical studies that were expected to be in line with the realization of metadiscourse. The writer's recognition of the reader's presence is crucial in any communicative scenario to achieve social and rhetorical goals. Consequently, writers must anticipate and address potential objections to their perspectives while striving to establish a connection with their readers.

IMMs center around the communication between writers and readers. In this context, writers utilize various linguistic resources to convey their viewpoints and establish a connection with the readers (Hyland 2019). The purpose of IM is to effectively engage the reader by persuading, informing, or simply creating a sense of involvement. Certain studies have a substantial impact on uncovering the roles of metadiscourse as rhetorical devices within a specific register. Their shared objective is to investigate how different linguistic devices reflect the attitudes and evaluations of writers, as well as how they contribute to establishing a strong interpersonal connection with readers (e.g., AI-Subhi, 2022; Herriman, 2022).

In the realm of artificial intelligence, chatbots have revolutionized the way users interact with technology. These AI-powered assistants, such as ChatGPT, utilize natural language processing to understand user input and provide personalized recommendations. By integrating metadiscourse techniques, chatbots can enhance the conversational experience and offer more tailored assistance to users. On the other hand, academics have shown interest in intelligent chatbots, computer applications replicating human-like behavior, due to their ability to engage with learners in their desired language in a prompt and authentic manner (Kashyap, 2023). Such chatbots can provide real-time support and tutoring services. As a result, these chatbots possess the capability to engage in communication with users and acquire knowledge from previous interactions, enhance their performance over time, and serve as language-learning assistants. Indeed, rich input is essential in promoting the successful acquisition of a second language. Artificial intelligence (AI)-powered chatbots have been recognized for their ability to offer linguistic input and opportunities for regular practice of conversational skills (Huang et al., 2022). Furthermore, they can spark the interest of language learners and improve their

overall language skills (Kohnke, 2022). Furthermore, AI-powered chatbots have the capability to conduct formative assessments and offer immediate feedback, which are crucial elements in promoting effective language acquisition (Kuhail et al., 2023). ChatGPT, developed by Open AI and released in November 2022, is considered one of the chatbots that stand out for its advanced capabilities. It utilizes a generative, pre-trained transformer model, surpassing the capabilities of traditional digital assistants that rely on automated speech recognition, natural language processing, and limited AI. ChatGPT is designed to support language learning by developing authentic interactions. It possesses the capability to understand the meaning of vocabulary items within a given context, provide corrections and explanations for language mistakes, generate texts in different genres, and provide dictionary definitions, example sentences, and translations. These features contribute to a comprehensive language learning experience for users.

Both ChatGPT-based instruction and FLLI are theoretically supported by constructivist theories (Fan, 2022). Constructivism highlights the active engagement of learners in the process of constructing their meaning. Instead of simply absorbing information, learners engage in reflection on their experiences, form mental models, and integrate new knowledge into their existing frameworks (McCourt, 2023). Constructivist learning theory serves as the foundation for a range of learner-centered language teaching methods that differ from traditional educational approaches (Spivey, 2023). Both FLLI and ChatGPT were examined in the current study because foreign language learning can be enhanced by creating opportunities and allocating sufficient time for learners to actively participate in classroom activities. Therefore, ChatGPT-based instruction and FLLI both provide language learners with enough input. They both emphasize the ways in which language learners shape and understand reality by engaging in interactions and creating representations.

As studies on IM look at learners' writing, most of them focus on a division between native and non-native users of a language. So far, the researchers have tried to find out how cross-cultural and cross-linguistic differences affect a variety of IM categories in different kinds of general academic discourse. Nevertheless, few have examined the teaching strategies helping second language learners (SLL) to employ IMMs in their writing skill. The purpose of this study is to enhance the comprehension of how SLLs develop persuasive arguments in written form. This will be achieved by examining their employment of metadiscourse patterns in argumentative essays written under controlled conditions, FLLI, and ChatGPT-based instruction. The present study utilizes Hyland's (2019) IM model, demonstrating the categorization of metadiscourse and the essential

supplies for academic interaction. Moreover, the effect of ChatGPT-based instruction on metadiscourse use by language learners is also examined. As such, this study aimed to compare the suitability of the ChatGPT-based instruction vs FLLI classes. To address this gap, we posed the following two research questions:

1. Are there any significant differences between ChatGPT-based instruction and FLLI on the employment of IMMs in argumentative writing by Iranian EFL learners across proficiency levels?
2. How do Iranian intermediate and advanced EFL learners perceive ChatGPT-based instruction and FLLI in the context of language learning regarding IMM use?

Literature Review

International Metadiscourse

Metadiscourse is a multifaceted notion that has been extensively researched, although it needs a definite theoretical structure and a single, unique definition. As a result, empirical studies often struggle to adopt a robust methodology leading to the understanding of metadiscourse. In the context of this particular study, metadiscourse is defined as linguistic elements found in written texts that do not contribute directly to the main message but rather assist readers in organizing, interpreting, and evaluating the presented information (Hyland, 2019).

IM pertains to how writers engage with their audience by inserting comments and reflections within their message. Writers aim to clearly express their opinions and engage readers by inviting them to react to the evolving text. This represents writers' unique writing style, or recognized persona within a community, and encompasses how they express opinions and openly connect with readers (Chen & Li, 2023). In this context, metadiscourse serves as a means of evaluation and interaction, demonstrating a sense of unity. Interactional resources engage readers and create chances for them to participate in a conversation by informing them about the author's stance on both factual content and the readers themselves (Qiu et al., 2024). They regulate the personality level in a text as writers recognize and engage with others, drawing them into their argument, directing their focus, acknowledging their doubts, and leading them toward interpretations (Ädel, 2023). This research highlights IM as it is essential in academic communication by enabling writers to signal their presence, negotiate claims of knowledge, and engage their readers. As the focus of the study is on argumentative writing, the main purpose of which is to persuade the readers, and IM plays a significant role in enhancing persuasion within

such discourse, our research is restricted to IMMs. Table 1 provides details on the different categories of IMMs.

Table 1.
*Interactional Metadiscourse in Hyland's Model (*Hyland, 2019, p. 58)

Interactional metadiscourse	Definition	Examples
Hedges	refrain from commitment	perhaps; about
Boosters	emphasize assurance	certainly; clearly
Attitude markers	conveying the writer's stance	unfortunately, I agree
Self-mentions	author mention	I; my
Engagement markers	intentionally foster a connection with the reader	consider; note

Comparative examinations of metadiscourse resources in learners' writing have been productive, focusing on revealing differences in writing practices among learners from varying linguistic and cultural backgrounds (Qui et al., 2024). Han and Gardener (2024), for example, qualitatively compared metadiscourse markers between Chinese learners and native English writers, revealing a notable distinction in the use of addition markers and their collocates. Specifically, the analysis highlighted the difference between connecting multiple points using addition markers and consolidating points into a cohesive argument through the use of a shell noun or reinforcing an argument with collocates. This comparison sheds light on the nuanced differences in language usage between these two groups of writers in academic settings.

To date, the majority of studies on metadiscourse have concentrated on academic writing, such as research articles (RAs) and theses (Mauranen, 2023; Ädel, 2023; Qiu et al., 2024). For instance, RA introductions may contain numerous self-references to discuss prior studies (Harwood, 2005; Kim & Lee, 2014). In contrast, RA discussions often incorporate more hedging devices to soften the presentation of research findings (Liu & Buckingham, 2018). Considerable studies have been done to examine metadiscourse use in academic theses (Khoshsima et al., 2018; Kondowe, 2014), and metadiscourse across languages (Izquierdo & Pérez Blanco, 2023); The findings of these studies showed that the frequency of commentary markers tends to increase in moves that are overtly persuasive or instructional in nature and differences in metadiscourse patterns within a specific move can be attributed to variations across languages, which may be influenced by cultural factors or language-specific preferences.

Extensive research has also been carried out to explore metadiscourse use in different genres, including leading newspapers (Chen & Li, 2023), instruction booklets (Herriman,

2022), different types of letters (Lee, 2021), and advertisements (AI-Subhi, 2022). These investigations help uncover the role of metadiscourse as a rhetorical tool within specific registers. Moreover, a variety of studies were conducted to differentiate between metadiscourse use and the writers' experiences and cognitive styles (e.g., Esfandiari & Allaf-Akbary, 2022). An implication of this is how English writers of different personalities and learning experiences utilize metadiscourse features to contribute to the development of instructional materials.

Flipped Language Learning Instruction

The advancement of technology and the wide range of technological and digital tools accessible to second language (L2) instructors and learners have brought about significant changes in the L2 curriculum. This has led to the development of a new pedagogical approach known as flipped language learning instruction (FLLI). In this approach, traditional teaching is followed by various collaborative tasks that take place outside the classroom, allowing learners to engage with materials and resources at home (Lockwood, 2023). Flipped learning is an approach that prioritizes the learner and utilizes technology, where the traditional teaching method is inverted for enhanced effectiveness (Voss & Kostka, 2019). The flipped classroom model involves a reversal of traditional classroom activities. In this approach, tasks that were traditionally done in the classroom, such as listening to lectures, are assigned as homework. Conversely, what was traditionally considered homework, such as problem-solving or practice exercises, is completed in class with the guidance of the instructor. This means that students watch video lectures or instructional materials outside of class and come prepared to engage in active learning and collaborative activities during class time. The instructor's role shifts from primarily delivering content in the classroom to facilitating discussions, providing support, and addressing any questions or challenges that arise while participating in in-class activities (Walker et al., 2020).

In order to investigate the impact of FLLI on learners' progress in English language skills, in a quasi-experimental study conducted by Öztürk and Çakıroğlu (2021), compelling evidence was presented to support the presence of a favorable influence and correlation. Furthermore, the integration of self-regulated learning strategies was shown to positively impact the development of foreign language skills in educational settings. In a similar vein, the use of AI-powered platforms, such as chatbots, demonstrated significant benefits in enhancing language learning outcomes. The study indicated that learners utilizing platforms incorporating self-regulated learning strategies excelled in

various language skills assessments, including speaking, reading, writing, and grammar tests. This synergy between effective pedagogical approaches and technological advancements highlights the potential for optimizing language learning experiences in modern educational environments.

Furthermore, Vaezi et al. (2019) carried out a study to explore the perception of Iranian students and instructors towards the implementation of the FLLI. The findings of their research revealed a favorable perception among participants regarding the adoption of this approach. In a study that closely resembled the current research in terms of scope, Baig and Yadegaridehkordi (2023) conducted an in-depth examination of the improvement of higher education by incorporating FLLI. Through an exploration of the significance of technologies, pedagogical practices, and the obstacles linked to this teaching method, the research provides beneficial perspectives for educators and establishments interested in adopting the flipped learning strategy.

Prior research has also shown that, as an instructional method, flipped instruction enhances students' critical reading skills (Fatemeh et al., 2020; Khodabandeh & Hemmati, 2020), promotes their writing performance (Wu et al., 2020; Sengul et al., 2022), improves their ability to remember words (Kirmizi & Kömeç, 2019; Rezaei Fard et al., 2021), strengthens their oral performance (Chen & Hwang, 2020), and increases their ability to understand spoken language (Namaziandost et al., 2020).

ChatGPT AI System

ChatGPT has the capacity to significantly improve the efficiency of language learning through personalized instruction and practice. One key advantage is its ability to offer instant feedback on language usage. Learners can utilize ChatGPT to practice verbal communication or writing in a foreign language, and the model can promptly provide feedback on syntax, lexical knowledge, and sentence structure (Peachey, 2023). This enables learners to quickly identify and correct their mistakes, saving time and expediting the learning process. Additionally, ChatGPT can enhance language learning efficiency by offering a wide array of practice materials (Kartal, 2023). The model can generate various language learning exercises, including flashcards, quizzes, and reading and listening materials, allowing learners to practice different aspects of the language. By providing a diverse range of practice materials, ChatGPT facilitates more efficient and effective language learning.

Furthermore, ChatGPT offers assistance to learners by providing text summarization services. Learners can benefit from this feature as it helps them comprehend and

remember new information by condensing texts, articles, and other materials in their desired language (Lee Wang et al., 2023). By focusing on the main ideas and concepts, learners can enhance their understanding and retain knowledge for a longer duration. In general, ChatGPT has the capability to enhance language learning efficiency through personalized instruction, immediate feedback, a diverse array of practice materials, and streamline the learning process to be more effective and time-saving (Shobha & Anbu, 2023).

Xiao and Zhi (2023) conducted a small-scale qualitative study to investigate how students perceive and use ChatGPT for language learning. The research methodology involved semi-structured interviews with five students who were enrolled in a prestigious international university in China. The feedback received from these students revealed that ChatGPT holds promise as a valuable learning companion, as it assists them in various language-related tasks. Moreover, the participants demonstrated their ability to critically evaluate the ideas and outputs generated by ChatGPT, and they also showcased their proficiency in adapting prompts to enhance their learning experience. This capacity to exercise critical judgment helps alleviate concerns regarding academic integrity when utilizing ChatGPT. The outcomes of this investigation enhance the current knowledge base regarding the possible uses of ChatGPT in the realm of language education. It presents concrete evidence based on students' viewpoints. The study affirms that ChatGPT is capable of delivering prompt feedback and tailored learning experiences to students with great effectiveness. These findings have implications for future pedagogical practices, emphasizing the significance of offering students personalized guidance, integrating technology-based language support, and fostering the enhancement of reasoning capabilities within the realm of language learning.

In the realm of developing pronunciation abilities, a recent investigation carried out by Yang et al. (2022) unveiled that learners who engaged with a specially crafted chatbot for pronunciation experienced noteworthy advancements in their capacity to accurately enunciate words compared to a control group. Furthermore, chatbots offer the added benefit of delivering prompt feedback to language learners, thus fostering learner independence and self-correction. In a connected study, Chen et al. (2022) utilized a chatbot as a tool to support learners in enhancing their writing abilities through automated feedback on grammar, vocabulary, and sentence structure. Consequently, learners demonstrated a progressive enhancement in their writing performance as time progressed. Additionally, Kim (2018) created a chatbot that specifically emphasized vocabulary acquisition. This chatbot provided learners with relevant vocabulary items integrated into

meaningful contexts and offered instant feedback on their usage. As a result, this approach led to a noticeable enhancement in learners' retention of new vocabulary. Overall, these studies underscore the immense potential of chatbots in enriching language proficiency, providing tailored educational encounters and fostering favorable outcomes in various linguistic proficiencies.

Method

Participants

The initial number of students was 85 undergraduate male and female students pursuing a degree in English Language Teaching at Mohaghegh University in Ardabil, Iran. The age range of the learners was between 24 and 28. The reason for selecting these students was that they constituted a homogeneous group in terms of their writing abilities, which served as the starting point for our study. To select the participants, we divided them into two groups based on their performance. Thirty-two students scoring 70% or higher on the paper-based TOEFL proficiency test were classified as advanced participants. Thirsty-one students scoring between 46% and 69% were categorized as intermediate participants, following the classification method outlined by Phakiti (2003). As a result, students who scored below 45% were excluded from the study. Therefore, 22 beginning students were not included in the research.

Four language learners in each group (n = 16) agreed to voluntarily participate in a follow-up interview to express their attitudes towards the instructional methods used in this study.

Instruments

Four assessment instruments were utilized in this study: TOEFL test, IELTS rating scale, interview, and a questionnaire. The paper-based TOEFL test was employed as the instrument in this research, aiming to classify students into two distinct levels of proficiency. This assessment comprised 40 structure items, 50 listening comprehension items, and 50 reading comprehension items. The reliability estimated in the context of the study was .72.

The second assessment tool utilized was the public version of the IELTS scale to evaluate the students' writing essays. This scale consists of nine bands and incorporates four criteria for assessing IELTS essays. These criteria include the accomplishment of the task, the logical flow and connection of ideas, the vocabulary used, and the range and accuracy of grammar.

The third instrument was a researcher-made, semi-structured interview on how the learners feel while they follow ChatGPT-based instruction. The development process of the interview was done through five stages suggested by Dörnyei (2007). Finally, three interview questions were developed, including:

1. How does the implementation of ChatGPT-based instruction impact the identification of IMMs in argumentative writing?
2. In what ways does ChatGPT facilitate the enhancement of persuasive language skills through IMMs in writing argumentative essays?
3. How does FLLI affect the identification of IMMs in argumentative writing?

In order to guarantee the content validity of the interview, two experts in educational psychology were requested to evaluate the items. Regarding the reviews, the researchers reduced the items from nine to three items.

The fourth instrument was the perception of the flipped learning questionnaire. The perception of flipped learning experience survey was conducted to assess the students' viewpoints regarding the fulfillment of the flipped learning methodology in a higher education setting. Chen Hsieh et al. (2017) originally devised this survey, and its reliability and validity have been verified. The reliability index was .82 in Chen Hsieh et al.'s study. Following the analysis of the pilot study results, the reliability of the questionnaires in the context of the present study was assessed using Cronbach's alpha. The questionnaire demonstrated acceptable reliability, with a coefficient of .75. The questionnaire underwent a review by two professionals in the EFL field in order to enhance its content validity.

The initial survey is comprised of 14 questions encompassing four key elements: motivation, effectiveness, engagement, and overall satisfaction. The participants expressed their opinions using a 5-point Likert scale ranging from "strongly disagree" to "strongly agree" (1 to 5).

Procedure

The present study followed the sequential explanatory mixed-methods research design. To assess and judge the writing ability of the learners in both the pretest and posttest stages, the second researcher of the present study asked learners to write an argumentative essay. The study utilized a pretest-treatment-posttest design, which spanned over a duration of eight sessions in four weeks. FLLI group consisted of two different classes namely, 16 advanced and 16 intermediate ones. In the same way, the

ChatGPT group included one advanced group with 15 participants and one intermediate group with 16 participants. All participants in the two experimental groups underwent a treatment before the posttests.

In the pretest stage of the research, the participants' knowledge of IMMs used in argumentative writing regarding two different proficiency levels was determined. The metadiscourse pretest was conducted with all participants prior to the implementation of grouping procedures and the relevant instructional courses. The pretest consisted of a passage adapted from the book "Inside Reading 3" by Oxford University Press. Participants were instructed to identify and underline IMMs within the passage. If participants mistakenly underlined words that held propositional meaning, they were randomly assigned to one of the study groups. Conversely, if participants correctly identified IMMs, they were excluded from further analysis.

At the beginning of the semester, the individuals were given information about the specific goals of the study. Prior to their involvement in the study, the participants' approval was secured to ensure that participation was done willingly or by choice. At the start of the course, participants in the FLLI groups (advanced and intermediate) were provided with PowerPoint files and recorded videos focusing on introductory concepts of IMMs and subcategories of IM. These materials were shared with the participants in a group created on Instagram one week before the scheduled class meeting. They were specifically instructed to thoroughly review the materials and watch the videos in order to prepare themselves for a quiz that would take place at the beginning of the class.

To foster participants' motivation and active engagement with the assigned materials, a brief quiz was administered prior to each session. The purpose of these quizzes was to evaluate participants' comprehension of the materials. After completing the quizzes, participants had the opportunity to self-assess and engage in peer assessment to correct their answers. This approach aligns with the motivational strategy of utilizing quizzes as a means to promote active learning (Kaviani et al., 2018). During the treatment sessions, lasting for one instructional hour, the participants actively participated in a question-and-answer session and engaged in discussions related to IMMs covered in the PowerPoint files and video materials. The main purpose of this part was to address any uncertainties and foster a deeper comprehension of IMMs and the way they are used. The researchers took on the role of facilitators during the study. In situations where diverging opinions emerged within the members of the group or between distinct groups regarding the selection of items or activities, the instructor, the second researcher, provided guidance to the participants.

In the subsequent part of the session, which extended for two instructional hours, the students were divided into groups. Their task involved reviewing school textbooks and sample exam papers. The objective was to identify and analyze specific types of listening, speaking, and other activities or items that were the primary focus of the session. The purpose of this task was to raise the learners' consciousness and inspire the practical use of the concepts obtained from the given materials. The researchers did not directly teach the lessons but provided examples as texts for the participants to realize the IMMs. On the other hand, the two classes (advanced and intermediate) of the ChatGPT AI system were provided with computers, and participants asked the ChatGPT system to explain IM in the first session by answering follow-up questions (Figure 1).

The learners utilized ChatGPT to generate responses for the questions related to target IMMs, engaging in discussions with peers. The learners collaborated in pairs on a ChatGPT-assisted writing task. In each session, learners received IMM resources as prompts from the teacher, which they input to ChatGPT to brainstorm, plan, and craft a story. After taking notes on the story suggested by ChatGPT, the learners shared their narratives with their peers during the online session. They were prompted to inquire and participate in conversations regarding each other's stories including IMMs. Subsequently, learners were motivated to create their own prompts (IMMs) in the ensuing weeks to nurture independence and innovation.

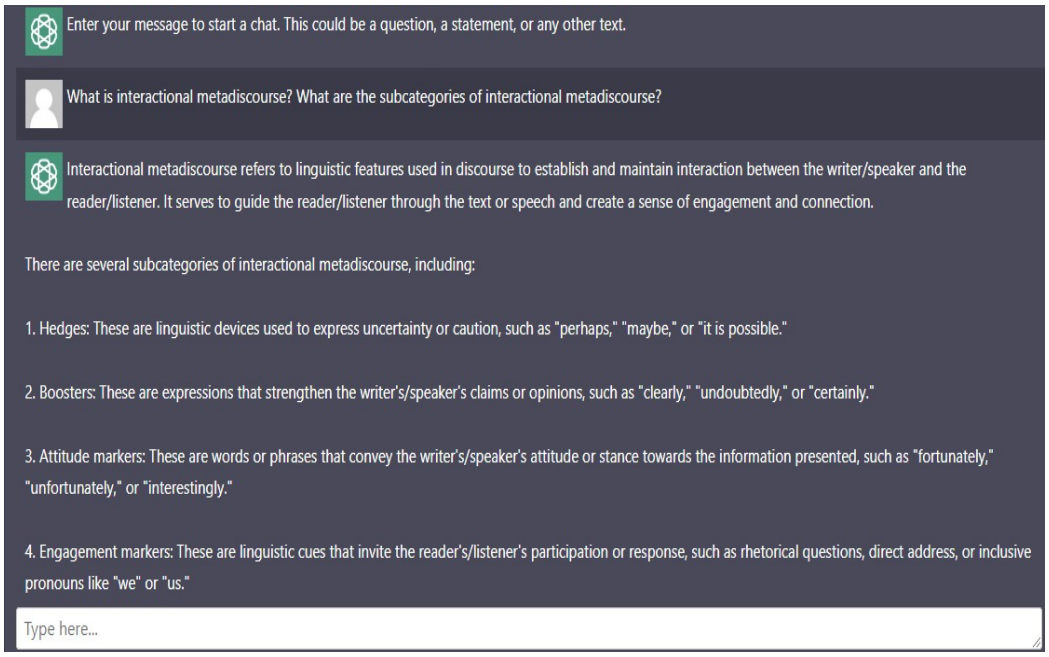

Figure 1. *ChatGPT Response to Questions about IMMs*

Furthermore, in the next sessions, participants used ChatGPT to secure explanations and illustrations. For example, ChatGPT identified IMMs and gave sample sentences (Figure 2).

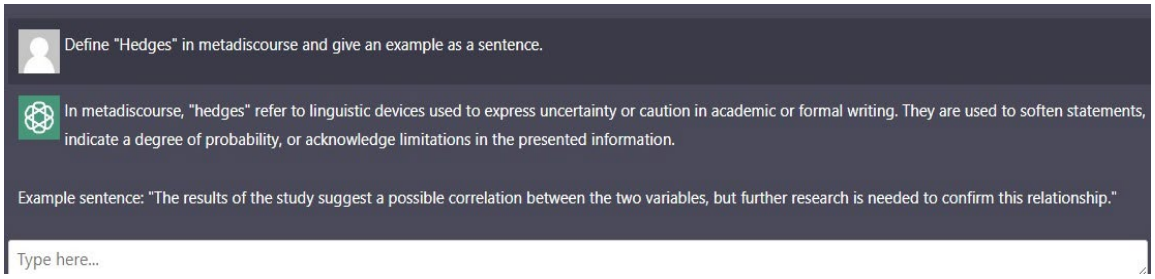

Figure 2. *ChatGPT Definitions and Sample Sentences*

The students employed ChatGPT to produce answers for inquiries related to specific IMMs, engaging in dialogues or short stories with classmates. They worked in pairs on a writing assignment aided by ChatGPT. In each session, students were given IMM materials as cues by the instructor, which they fed into ChatGPT to generate ideas, organize, and develop a narrative. Following the outline provided by ChatGPT, students exchanged their dialogues or stories with peers. They were encouraged to ask questions and engage in discussions about each other's narratives, including the IMMs. Consequently, students were inspired to create their own cues (IMMs) in the following weeks to foster autonomy and creativity. ChatGPT was required to create a dialogue or a story, including subcategories of IMMs. It modified the intricacy of the conversation to better suit participants at an intermediate or advanced level. (Figure 3).

Figure 3. *Dialogue Generated by ChatGPT Using IMMs*

Data Analysis

The first research question was addressed using the two-way analysis of variance (ANOVA) to examine the effect of instructional methods (ChatGPT-based instruction and flipped language learning) on the use of IM across two proficiency levels (two intermediate and advanced groups). Regarding the second research question, the study investigated the perspectives of EFL learners on ChatGPT-based instruction and FLLI. To analyze the responses provided by the participants on FLLI and ChatGPT AI system questionnaire, scores were assigned to each item using a scale proposed by Perception Questionnaire (Hsieh et al., 2017) and open-ended interviews. For the qualitative data analysis, MAXQDA was utilized.

Results

Investigation of the First Research Question

The first research question aimed to investigate the impact of FLLI and ChatGPT-based instruction with varying levels of language proficiency on the realization of IMMs. In order to answer this question, a two-way ANOVA procedure was employed to assess the effects of different types of instructions on participants' understanding of IMMs. Prior to proceeding with the analysis, the assumptions of the two-way ANOVA were rigorously checked. Initially, the assumption of equal variances was checked. This assumption was not violated ($p > .05$) (Table 2). Additionally, the normality of scores was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests (Table 3). The obtained results affirmed that the assumption of normality was satisfactorily met ($p > .05$). Moreover, following an examination of the assumptions, descriptive statistics such as the mean and standard deviation pertaining to IMMs in the posttest were presented in Table 4. This comprehensive analysis provides a clear overview of the data, enabling a deeper understanding of the test results.

Table 2.

Levene's Test of Equality of Error Variances for Realization of IMMs

		Levene Statistic	df1	df2	Sig.
Interactional metadiscourse	Based on Mean	2.61	3	59	.06
	Based on Median	2.24	3	59	.09
	Based on the Median and with adjusted df	2.24	3	50.53	.09
	Based on trimmed mean	2.62	3	59	.05

Table 3.

Results of the Test of Normality of Data for Realization of IMMs

	Instruction types	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Interactional metadiscourse	FLLI	.17	32	.09	.93	32	.06
	ChatGPT-based instruction	.20	31	.06	.92	31	.08

Table 4 shows that advanced learners, whether FLLI or ChatGPT-based instruction, tend to have higher mean scores compared to intermediate learners. Specifically, compared to the FLLI group, the ChatGPT-based instruction group had the highest mean in terms of both levels. The variations among the groups are visually represented in Figure 4.

Table 4.

Descriptive Statistics for the Realization of IMMs

Instruction types	**Proficiency levels**	**Mean**	**Std. deviation**	**N**
FLLI	Advanced	28.75	2.59	16
	Intermediate	26.50	3.94	16
	Total	27.62	3.48	32
ChatGPT-based instruction	Advanced	45.20	3.64	15
	Intermediate	36.50	2.03	16
	Total	40.70	5.27	31
Total	Advanced	36.70	8.91	31
	Intermediate	31.50	5.94	32
	Total	34.06	7.93	63

The tests of between-subjects effects were conducted to determine the statistical significance of the differences between the means. The results of these tests can be found in Table 5.

Table 5.

Tests of Between-Subjects Effects for the Realization of IMMs

Source	**Type III sum of squares**	**df**	**Mean square**	**F**	**Sig.**	**Partial eta squared**
Corrected Model	3322.34	3	1107.44	111.99	.00	.85
Intercept	73791.35	1	73791.35	7462.61	.00	.99

Source	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Instruction types	2752.53	1	2752.53	278.36	.00	.82
Proficiency levels	471.74	1	471.74	47.70	.00	.44
Instruction types * proficiency levels	163.68	1	163.68	16.55	.00	.21
Error	583.40	59	9.88			
Total	77006.00	63				
Corrected Total	3905.74	62				

According to Table 5, there was a statistically significant main effect for instruction types ($F_{(1,59)} = 278.36$, $p < .05$). Based on Cohen (1998), the effect size was large (partial eta squared =.82). It is indicated that the mean score for the ChatGPT-based instruction group ($M = 40.70$, $SD = 5.27$) was significantly different from the FLLI group ($M = 27.62$, $SD = 3.48$). The main effect for proficiency levels ($F_{(1, 59)} = 47.70$, $p < .05$) and the interaction effect ($F_{(1, 59)} = 16.55$, $p < .05$) reached statistical significance. That is, it can also be observed that the advanced learners outperformed the intermediate learners in both treatment groups. As shown in Figure 4, the lines are not parallel, so the interaction effect can be seen in that both advanced and intermediate learners following ChatGPT-based instruction outperformed the learners with the same levels of language proficiency following FLLI.

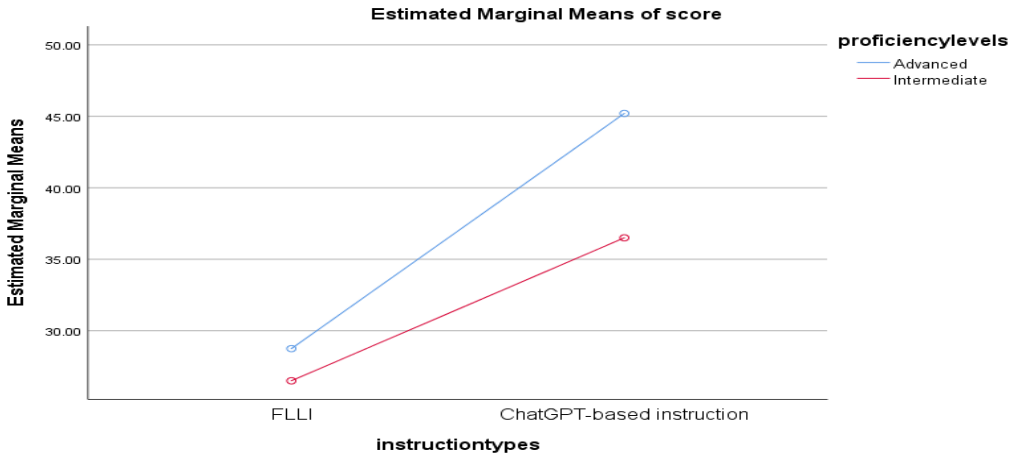

Figure 4. *Mean Plot of IMMs Realization Posttest*

Investigation of the Second Research Question

To explore the second research inquiry and ascertain how participants perceive the FLLI, the researchers explored the average rating of each statement on the perception

questionnaire (Hsieh et al., 2017) for every specific language proficiency level. The results obtained from the questionnaire are demonstrated in Table 4.

Table 4.
Mean Scores of Intermediate and Advanced Participants' Perceptions of FLLI

Item	Statement	Mean (Intermediate)	Mean (Advanced)
1	A flipped classroom offers a more effective learning approach than does ChatGPT-based instruction.	**3.53**	**3.87**
2	I preferred the flipped classroom teaching method.	**3.79**	**3.32**
3	I believe that the flipped classroom model offers a more effective and efficient approach to learning.	**3.20**	**4.01**
4	I experience increased motivation in a flipped classroom setting.	**4.11**	**3.42**
5	I actively took part in and immersed myself further in the learning process within the flipped classroom setting.	**3.90**	**4.30**
6	I took on a more engaged role as a learner in the flipped classroom setting.	**4.88**	**3.23**
7	I found the time and effort I invested in the flipped classroom to be valuable.	**3.76**	**4.32**
8	The flipped classroom approach fostered a superior learning environment compared to the ChatGPT class.	**3.99**	**3.56**
9	I find the flipped classroom more favorable.	**4.56**	**4.78**
10	The flipped classroom approach has undoubtedly facilitated my comprehension of the course subjects.	**4.47**	**4.21**
11	I derived satisfaction from the flipped classroom.	**3.88**	**3.56**
12	I dedicated a greater amount of my effort to the class activities within the flipped classroom.	**4.70**	**4.82**
13	I allocated extra time and applied greater effort compared to my regular routine to actively participate in flipped classroom learning activities.	**4.04**	**3.67**
14	In general, I find myself content and fulfilled with this flipped learning encounter.	**3.99**	**3.22**
	Overall mean score	**4.05**	**3.87**

As presented in Table 4, it can be observed that the average scores for all items surpass the midpoint value of the scale, which is 3. Additionally, the mean score for the overall scale is recorded as 4.05. This outcome suggests that intermediate participants following FLLI expressed a high level of satisfaction and effectiveness regarding their experience in employing IMMs in the FLLI. On the other hand, regarding advanced participants following FLLI, it is clear that the average scores for all elements surpass the central value of the measuring scale. Moreover, the average score for the entire scale is documented as 3.87. The findings revealed that advanced participants involved in FLLI

expressed lower levels of satisfaction regarding the realization of IMMs compared to those at the intermediate level. The results of the independent-samples t-test revealed that there are no statistically significant differences between intermediate vs advanced FLLI groups regarding their perceptions of the effectiveness of FLLI in realization of IMMs, $t(30) = 1.05$, $p = .30$.

As for participants' perceptions regarding the ChatGPT AI system, the participants were required to answer three open-ended semi-interview questions. The responses provided by participants to the open-ended questions were analyzed using MAXQDA. While some participants offered concise viewpoints, others opted for more elaborate responses. The mean length of the responses amounted to 42.5 words. As shown in Table 5, inductive thematic analysis was done through MAXQDA, leading the researchers to encode different data segments to explore and determine patterns or themes of intermediate participants on ChatGPT regarding metadiscourse realization.

Table 5.
Codes and Themes from Intermediate Participants on ChatGPT Regarding Metadiscourse Realization

Code	Theme	Attitude
○ The extraordinary potential of ChatGPT	Excitement and great interest	**POSITIVE**
○ Surpasses its counterparts in terms of performance and functionality		
○ significance of artificial intelligence		
○ Source for introducing subcategories of metadiscourse	Effective learning	**POSITIVE**
○ Supplementary tool for enhancing the learning IMMs through examples.		
○ Maximizes the learning effects		
○ Clarification metadiscourse through subsequent questions	Human-like	**POSITIVE**
○ Motivating	Interesting	**POSITIVE**
○ Great explanation		
○ Structured responses	Organized	**POSITIVE**
○ Time-saving		
○ Not reliable	Inaccurate and incomplete	**NEGATIVE**
○ Having some errors		
○ Should be improved		
○ Not as accurate as human knowledge on metadiscourse	Sometimes tricky	**NEGATIVE**
○ Giving some incorrect examples		
○ Incomplete explanation of metadiscourse	Uncertain	**NEGATIVE**
○ Unclear future		

Concerning the perceptions of advanced participants on ChatGPT regarding metadiscourse realization, Table 6 shows that advanced participants benefitted more than intermediate ones in learning metadiscourse through ChatGPT. Advanced participants got slightly greater satisfaction compared to intermediate ones.

Table 6.
Codes and Themes from Advanced Participants on ChatGPT Regarding Metadiscourse Realization

Code	Theme	Attitude
○ ChatGPT as a mediator of learning metadiscourse	ChatGPT as a facilitator	**POSITIVE**
○ ChatGPT as a supporter of language learning		
○ Easy to use and search		
○ ChatGPT as a complementary source of subcategories of metadiscourse	Motivating and influential	**POSITIVE**
○ ChatGPT as a supplementary tool available to develop the learning of IMMs through the use of examples.		
○ Enabling students to enhance their learning efficiency on metadiscourse through subsequent questions	Good explanation	**POSITIVE**
○ Enough elaboration on metadiscourse	Organized	**POSITIVE**
○ Structured responses		
○ Easy to use		
○ Time-saving	Occasionally complicated	**NEGATIVE**
○ Having some mistakes		
○ Needs to be developed		
○ Giving some tricky examples		
○ deficient explanation of metadiscourse	ambiguous	**NEGATIVE**

Discussion

The principal aim of this study was to examine the influence of employing the ChatGPT-based instruction and the FLLI on the manifestation of IM in persuasive writing tasks among Iranian EFL learners with varying levels of proficiency. Additionally, the research sought to investigate the viewpoints of EFL students regarding the use of ChatGPT-based instruction and FLLI in employing IMMs during argumentative writing tasks. Firstly, the study found that both ChatGPT groups demonstrated a higher frequency of using IMMs in argumentative writing tasks compared to the two FLLI groups. This finding may imply teaching techniques play a vital role in the employment of IMMs in writing tasks (Pearson & Abdollahzadeh, 2023). This is supported by El-Dakhs et al. (2022), arguing that explicit and implicit instruction can have differential effects on EFL learners' realization of IMMs in their writing. Both ChatGPT groups outperformed FLLI ones in using and realizing IMMs in argumentative writing tasks. Our findings confirm

that of Eghtesadi Roudi (2020), indicating that EFL learners expressed a positive perception of flipped learning and the adoption of flipped learning led to enhanced academic achievement among learners in the exam section requiring thinking skills such as analysis and synthesis.

Furthermore, this study revealed that language learners' proficiency level had an impact on using ChatGPT-based instruction to realize IMMs, meaning that advanced learners in the ChatGPT group outperformed all three other groups in the employment of IMMs. This could potentially be attributed to the ability level of the learners with high proficiency levels who were able to use the ChatGPT AI system more effectively (Kohnke et al., 2023). The results of the study suggested that advanced and proficient participants experienced higher levels of satisfaction with ChatGPT-based instruction while learning IMMs. This is in line with Peachey (2023), claiming that in order to effectively use ChatGPT, the learners should possess a sufficient background in the relevant field of study. This capability empowers them to create suitable prompts and critically assess the responses offered by the system. Regarding the two groups following ChatGPT, it was evident that those groups were more successful than FLLI groups in the realization of IMMs. This is confirmed by Ahmed et al. (2023), arguing that a significant number of learners perceive ChatGPT as an engaging and influential instructional resource for English courses. The interactive nature of ChatGPT enhances their comprehension of the material, making it an interesting and valuable tool for learning. Moreover, this study showed that FLLI, to some extent, may enable EFL learners to realize and use IMMs in their language production, though not better than ChatGPT. This finding aligns with Wu et al. (2020), stating that following flipped learning in EFL classes is considered an encouraging educational method.

Our research focused on the significant topic of integrating AI-powered technology tools into language instruction. While there are ongoing debates about the effect of ChatGPT on language learning (Kohnke et al., 2023; Moorhouse, 2023), our study contributes positively by affirming the idea that ChatGPT can be a valuable resource for instant feedback and individualized educational opportunities (Chen et al., 2022). In this context, ChatGPT acts as a personalized language tutor for students. The individuals involved in our investigation relied on ChatGPT for various tasks, including analyzing text, providing guidance on essay structure and content suggestions, and receiving examples of influential markers for supporting their ideas. The findings implied that ChatGPT-based instruction has the potential to be a tutor, especially in larger classrooms where teachers may not always be readily available. Yan (2023) has reported that the use

of AI tools like ChatGPT has been associated with an improvement in the quality of written texts. Furthermore, our own research suggests that the effective utilization of ChatGPT-based instruction can enhance language proficiency. It was evident from our observations that students exhibited a commendable aptitude for critically analyzing the merits and drawbacks of ChatGPT, even with the lack of formal instruction, which is supported by Xiao and Zhi (2023). A noteworthy observation is that although there were some worries about some inaccuracies and incomplete explanations on markers through, as expressed by students in Yan's (2023) study, most of the EFL learners, particularly advanced ones compared to intermediate learners, in our study, displayed a more favorable attitude towards it.

Conclusion and Implications

The findings suggest that ChatGPT-based instruction has the capability to provide personalized feedback and direction through customized responses for each prompt. This feature holds the capability to enhance the quality of learning by making it more efficient. It has the potential to serve as an appropriate structure for varying proficiency levels in academic institutions within Iran. Moreover, this investigation adds value to the scarce practical research available on improving ChatGPT. Our research findings provide evidence that the incorporation of technology-enhanced tools, like ChatGPT, in the language classroom is a viable option. It is undeniable that we are currently witnessing an inevitable shift towards a new era of artificial intelligence. Consequently, there is a pressing need to revolutionize pedagogical tools to align with this emerging trend.

The study is methodologically limited as it solely gathered data from a limited number of EFL learners in the immediate aftermath of ChatGPT's inception. This preliminary investigation offers only initial glimpses into the ChatGPT, necessitating additional research involving larger and more diverse participant pools. To overcome this limitation, future studies may address it by incorporating a carefully crafted training program that comprehensively examines the experiences and perspectives of students. Despite the presence of specific limitations, this study presents noteworthy insights and enriches the existing comprehension within the ChatGPT domain. As a result, learners experience a significant change in these educational initiatives, where the emphasis moves away from conventional evaluation towards technology-based tools to make sure that language learning happens.

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