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The Role of Synchronous and Asynchronous Multimodal Scaffolding in Learners' Writing Complexity Improvement

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Abstract

Computer-Mediated Communication (CMC) modes can ease scaffolding through multimodality in collaborative writing tasks. However, there is an ongoing debate regarding synchronous and asynchronous CMC environments. Additionally, there are conflicting results regarding gender's pedagogical beliefs in CMC applications. The current study aimed to explore if there is a difference between synchronous and asynchronous multimodal scaffolding on the freewriting complexity of EFL learners. Besides, genders' perceptions about applying multimodal scaffolding were compared. Participants were 84 EFL learners who randomly assigned into three groups. For the pre-test, a picture, podcast, and movie were shared, and the participants were asked to complete their freewriting tasks individually within the allocated time. For treatment, one experimental group was scaffolded in a synchronous environment by sending messages on WhatsApp, and the other experimental group experienced asynchronous scaffolding via email. The results indicated that multimodal scaffolding is beneficial. However, no significant difference was found between the writing complexity of synchronous and asynchronous groups. Furthermore, a significant difference between males' and females' tendency to use multimodal scaffolding was uncovered. The findings highlighted the role synchronous and asynchronous multimodal scaffolding can play in collaborative writing tasks.

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1. Introduction

In the EFL writing area, syntactic complexity seems to be an intriguing issue that can be enhanced in CMC collaborative writing. Syntactic complexity is the most eminent measure of learners' writing development (Li et al. 2022). The studies have indicated that CMC collaborative writing increases learners' writing complexity (Dobao, 2012; Strobl, 2014). Theoretically, freewriting rests on Vygotsky's (1986) standpoint, which is argued that writing is a medium for establishing communication. Moreover, freewriting increases writing fluency which may assist learners to concentrate on the other aspects of writing (Yasuda, 2022). Although freewriting encourages learners to write, there are some criticisms (Ackerman, 1993).

With the rise of the internet and digitization, the role of CMC has been highlighted in writing collaboration (Bhowmik et al., 2019; Zhang, 2018). However, limited studies compared synchronous and asynchronous CMC learning regarding freewriting complexity. Asynchronous mode provides learners with more time to think and answer while in synchronous mode learners experience real-time interactions (Abram, 2003). Synchronous and asynchronous modes may affect learners' communications differently (Liu & Sadler, 2003). Although many advantages are recommended in favor of synchronous tools, research indicates more interest in asynchronous tools (Hrastinski & Keller, 2007).

The literature revealed that asynchronous collaborative writing was more motivating for learners than synchronous tasks (Bailey et al., 2021), and language learning would be facilitated through the suitable implementation of technologies in synchronous environments (Huffman, 2010). Besides, it exceeds in-person class boundaries as the learning environment is being empowered. Another research indicated that Second Language (L2) learners realized that asynchronous learning is efficient (Perveen, 2016).

Synchronous and asynchronous CMC modes create situations for learners to acquire multimodal literacies. It is believed that experiencing learning involving all senses is more purposeful and motivating (Ferrari et al. 2022). "Teaching with a multisensory approach means the instructor has to approach the learner via more than one sensory modality such as visual, auditory, and kinesthetic modalities, sometimes at the same time, and the learner should be prepared and encouraged to behave likewise" (Odisho, 2007, p. 5). Ferrari et al. (2022) examined the multimodal approach to teaching and learning. The findings revealed that employing various applications boosted learners' awareness and satisfaction. Hence, multimodality influences ELT and emphasizes the combination of language and other modes to create meaning. On the other hand, some researchers believe that employing social media in an educational setting may be distracting (Lee & Lee, 2022; Cao & Tian, 2020).

Additionally, the importance of the gender in CMC interactions has received little attention in educational settings. It is vital to assess learners' perceptions of the use of technology to select an appropriate medium to make the best use of opportunities. While there are differences between men's and women's viewpoints (Yates, 2001), some other research indicated that there are no significant gender differences about online EFL learning (Kim, 2019). However,

there is some evidence to report that females rated technology-based learning lower than males (Shuell & Farber, 2001).

2. Literature Review

2.1 Synchronous and Asynchronous Learning

This study was grounded on the theory of Vygotsky's (1978) Sociocultural Theory (SCT) of learning. According to this theory, learning happens through social interactions in which learners can communicate, negotiate form and meaning, and scaffold each other in writing tasks (Jiang & Eslami, 2021). Though a large body of research examined the influence of CMC collaborative writing on learners' writing outcomes (Bikowski & Vithangage, 2016), few studies consider the influence of CMC synchronous and asynchronous writing collaboration. CMC is defined by Murray (2012, p. 399) as "communication that takes place between human beings via the instrumentality of computers" but limits it to "…include only text-based modes." By accepting this definition, CMC is considered to contain not only synchronous ("at the same time") but also asynchronous ("at different times"). Real-time interaction is provided in a synchronous environment, and the simultaneous presence of both parties is necessary (Salmon, 2013). Learners can communicate simultaneously and in the same place through synchronous tools, including instant messaging. Research recommends synchronous learning enhances learners' interaction and social presence experience (De Freitas & Neumann, 2009; Tolu, 2010). For instance, Mabrito (2006) compared the efficiency of collaborative Freitaswriting in synchronous and asynchronous environments. It was observed that students interacted more in the synchronous group due to the potential of synchronous tools. However, Kuyath (2008) provided evidence that synchronous chat is significantly more effective than email asynchronous for learning content. Although the advantages of the use of SCMC have been reported by some researchers (Abe, 2021), a minority of researchers mentioned some potential drawbacks to synchronous means such as chatting. Some possible problems include inadequate skills in using the keyboard, typing slowly, and limited coherence (Darhower, 2002).

It is claimed that the asynchronous mode dominates CMC educational area (Johnson & Aragon, 2003) since it provides more time for learners to develop their notions (An & Frich, 2006) which might be more relaxing for learners. However, the nature of synchronous activities can be intimidating (Pérez, 2003). Hrastinski (2008) believes that social interactions fail to occur in an asynchronous learning environment, and a lower level of social presence in asynchronous communication is reported (Rourke & Kanuka, 2009). Asynchronous communications do not depend on time, and learners send and deliver content at a different time through asynchronous tools such as email. Thus, the opportunity for simultaneous access to the content is not provided for the learners. Learners' output was examined in synchronous and asynchronous discussions. Results indicated limited discourse functions in asynchronous discussion. However, asynchronous discussion's delayed nature provides learners more time to produce syntactically complex language (Sotillo, 2000).

Successful employment of synchronous and asynchronous tools in EFL classes relies on the element of gender differences. The influence of gender in integrating technology has been noticed and studied for the last two decades (Tsai & Tsai, 2010). Although Hyde et al. (2008) argued that gender gaps are fading, Hashemi et al. (2022) mentioned that all participants hold

a favorable view towards implementing technology in learning settings. Similarly, some research indicated that the learners' viewpoints had not been affected by gender and intermediate learners are more eager about online learning than beginner and advanced learners (Cha et al., 2022). In contrast, Chanlin (2001) and Luik (2011) reported that males have more positive attitudes regarding computer applications. Indeed, there are controversial results about gender perceptions towards technology application.

2.2 Multimodality

The importance of the current research arises from the fact that few studies investigated multimodal scaffolding in the EFL setting, applying synchronous and asynchronous CMC modes. The multimodality approach considers interactions, and presentations more than just applying language and exploiting multiple modes that provide meaning (Kress, 2010). This approach is grounded on all meaning-making resources employed by people. Kress (2003) assumed it is impossible to view literacy separated from social and technological factors, and every mode contains its properties and objectives. He mentioned that there had been a move from the superiority of writing to the superiority of the picture as well as "from the dominance of the medium of the book to the dominance of the medium of the screen." Fernández-Fontecha et al. (2020) suggested various scaffolding techniques and believed that multimodal scaffolding combined with visual sources has attracted the attention of the EFL learners. For example, Sze Seau and Azman (2020) introduced a classroom innovation based on multiliteracies and scaffolding. Analyzing classroom data uncovered improvement in oral skills and more engagement. Some scholars pointed out that the ubiquitous multimodality in every learning resource may be challenging for learners since it would be difficult to work out why meaning is provided in different ways (Tang et al., 2014) and how multimodality enhances their writing (Jiang, 2018). In contrast, Pacheco et al. (2021) believed that learners' language understanding and engagement with content will promote through multimodality.

Motivated by the relative lack of focus on multimodal scaffolding, the current study sought to explore whether synchronous and asynchronous learning differ significantly in students' collaborative writing as they receive multimodal scaffolding.

RQ1. Is there any significant difference between the effectiveness of synchronous and asynchronous multimodal scaffolding on the free writing complexity of the learners?

RQ2. Is there any significant difference between male and female's tendency towards using multimodal scaffolding?

3. Research Methods

The current mixed-method study was undertaken at an English institute in Iran. The data collection instruments for both quantitative and qualitative stages are utilized. This design directed the study in two crucial stages: in the first stage, the qualitative data was collected to compare multimodal scaffolding in synchronous and asynchronous environments, and in the second stage, the quantitative data from the questionnaires enriched by qualitative data on the participants' views by using structured interviews towards multimodal scaffolding.

3.1 Participants

The participants were 84 EFL learners at the intermediate level of language proficiency. Oxford Placement Test (OPT) was administered to assure homogeneity. The participants, both male (*n*= 38) and female (*n*= 46), aged 17-22, took part in this study and were randomly assigned into two experimental groups (each 27 participants) and one control group (30 participants). Participants were learning English as a foreign language in Iran. The head of the institute was informed about the aim of this research, and primary approval was gained.

3.2 Materials

Several data collection instruments were used in this study. An Oxford Placement Test (OPT), a pre-test and a post-test, a questionnaire, and a structured interview. These instruments will be described below.

3.2.1 Oxford Placement Test

The Oxford placement test was used for placing students into groups corresponding to the eight levels of the series. In this study, the grammar part of OPT was conducted to determine the homogeneity of the learners. It consists of 120 multiple choice test items worth one mark each. Learners had 80 minutes to complete the test under severe testing conditions. According to the test manual, the test takers who scored 41- 60 out of 120 were considered intermediate learners. Sixteen learners who scored below 40 were omitted; in the end, only 84 students participated in this study.

3.2.2 Writing Pre-test

A pre-test was administered to determine the learners' current writing knowledge. The materials were provided and distributed to all groups through 3 different media, including a picture, podcast, and video. *Soul trailer* was chosen as the video, and the picture given to learners showed the process of making coffee through eleven stages, and they were asked to describe the stages. For the podcast, they were asked to listen to a track of *Mindset for IELTS*, book 1 by Crosthwaite et al. (2017).

3.2.3 Writing Post-test

Soon after the end of the treatment, for the post-test, a similar podcast, picture, and video, which were leveled to the material used in the pre-test, were sent to the same participants in all three groups. The podcast was a track of *Mindset for IELTS*, book 1. The picture indicated the different processes of producing coffee through twelve stages. Onward trailer was considered as the post-test video.

3.2.4 Questionnaire

To elicit the data and find out if there is a difference between male and female viewpoints regarding synchronous and asynchronous environments, a questionnaire with 42 questions with a 5-point Likert scale (strongly agree, agree, neutral, tend to disagree, and strongly disagree), was distributed in the experimental groups through WhatsApp messenger. Limited time was determined, and they were asked to send the filled questionnaires back before the deadline. This questionnaire was adopted from a study done by Choi (2008). The questionnaire was modified to make it more suitable for the purpose of the study. The questionnaire consists of different parts such as General Issues, Online Collaboration, Peer Help, and Percentage. 27 male and 27 female students filled in the questionnaire. Two English teaching experts who

were asked to evaluate the questionnaire confirmed its validity and reliability. Cronbach's alpha was used to measure the reliability of questions in this questionnaire, and it showed adequate reliability (= 0. 87). The results indicated that the reliability of total questions is very good.

3.2.5 Interview

Qualitative data was collected through a structured interview of 8 questions (See Appendix A) taken and modified from Khalil's (2018) study, and a few changes were applied according to the purpose of the study to assure the trustworthiness of the questionnaire findings. Two experienced teachers confirmed the validity of the interview questions.

3.3 Data Collection

We conducted this study employing a two-step process: collecting quantitative data so that we could provide a comparison between synchronous and asynchronous environments and qualitative data to obtain comprehensive details regarding the primarily collected information. In the beginning, 100 students in an EFL course, which was held for 16 sessions (two sessions a week), and every session lasted 90 minutes. The learners at the intermediate level of this course were announced that they could participate in research related to collaborative writing upon their consent. After their approval was obtained, the grammar part of OPT placement test consisting of 120 questions was administered during the allocated time to ensure that the language proficiency of all students was at the same level. Sixteen participants had lower proficiency and were eliminated from the research, and the 84 intermediate learners were randomly assigned into three groups, two experimental- groups of 27 and a control- group of 30. Participants received the in-class instructions on free writing. Moreover, three repetitive writing tasks were designed, a picture and a podcast based on their course book, *Mindset for IELTS* book 1, and a video (Soul trailer) through brainstorming and according to their interests. For the pre-test, the picture, podcast, and video were distributed among 84 students in all control and experimental groups during the first weeks. They were asked to complete freewriting tasks during the time allocated, individually at home (In every session, they had one writing task using one mode) in all control and experimental groups to determine the level of their writing complexity. Instruction on freewriting was provided, and to decrease misunderstanding, some freewriting samples were shared with all learners. After collecting their essays, they were informed that they would be asked to complete the other three freewriting tasks later in the course. Additionally, they were given some similar tasks to ensure that learners remembered freewriting during the short interval.

For post-test, the experimental groups were instructed on collaborative writing features to familiarize them with their writing tasks. After ensuring that all learners understood the writing situation, a similar picture, a podcast, and a video was shared through WhatsApp social networking. Then the participants in the synchronous (WhatsApp) group were required to complete their writing tasks as they consulted with their classmates or teacher. They were asked to help each other using WhatsApp as the mediation. Learners in the asynchronous (email) group were allowed to collaborate with their peers or teachers via email to complete their writing tasks. In synchronous and asynchronous groups, learners experienced freewriting based on a collaborative and interactive format that supports completing the whole task (Salas et al.,

2016). Email and WhatsApp were selected since they are popular applications among learners that are easily used. So, the efficiency of technology integration may increase (Zhang et al., 2014). In contrast to experimental groups, the participants in the control group were asked to do their freewriting tasks individually without scaffolding with anyone. For all three groups, time was allocated. In this study, we refer to the synchronous group as those who use WhatsApp mediation, and the learners communicating via email are addressed as the asynchronous experimental group. Similar to Jiang and Eslami (2021), an attempt was made to decrease the influence of confounders. Accordingly, online monitoring for out-of-class collaborative freewriting was implemented, and their chat texts and debate were observed.

The second phase centered on the participants' follow-up questionnaires and individual interviews to identify males' and females' viewpoints toward synchronous and asynchronous multimodal scaffolding. Soon after the post-test, learners in experimental groups were apprised that they would be asked to fill out an attitude questionnaire and answer a structured interview, respectively, for each time allocated. The former comprised 42 questions divided into three parts and were implemented to inspect both males' and females' ideas of utilizing technology in an EFL writing setting. The pdf format of Likert- scale questionnaire was sent to the learners via WhatsApp to collect learners' perceptions regarding the appliance of technology.

Shortly afterward, the six-question structured interview with twenty respondents consisting of ten males and ten females, who were randomly selected, was carried out. Similar to the questionnaire, the structured interview was conducted to gain in-depth insight into gender views. The text of questions, along with a voice message of their translations which an experienced teacher verified, was administrated to each individual, and their responses as voice messages or texts were received within the allocated time. They were translated and transcribed sequentially to clarify interviewees' beliefs and thoughts.

3.4 Scoring

Coh-Metrix version 3.0 was utilized to evaluate the writing complexity of participants in video (Appendix B), picture (Appendix C), and podcast writing tasks (Appendix D). This widely-used computational tool was applied to diminish subjectivity and bias. This software is based on a multilevel theoretical framework to scrutinize the difficulty of the text (Graesser & McNamara, 2011) and consists of about 80 to 100 indices depending on the version at word, syntax, text base levels, situation model, and genre structure (Graesser & McNamara, 2011; Pickering & Garrod, 2006). These indices are categorized into eleven groups. For each level of indices, scores are provided. Syntactic complexity is one of the categories consisting of seven variables (from 69-75). Four heuristics, not laws, are advised to help decide how many variables should be chosen. One piece of advice recommended is "the 20:1 rule says that you can use one variable for every 20 items in your corpus. For example, if you are looking at a corpus of 100 essays, then you can use 100/20 = 5 variables." (McNamara et al., 2014. p. 166). Concerning the above suggestion, four variables are chosen for every writing: left embeddedness (words before the main verb), minimal edit distance, syntax similarity, and the number of modifiers per noun phrase. The software provides the mean of each variable. This tool is available online on the Coh-Metrix website (www.cohmetrix.com), through which we can access Coh-Metrix 3.0 with about 108 indices used in this study.

4. Results

RQ1: Is there any significant difference between the effectiveness of synchronous and asynchronous multimodal scaffolding on the free writing complexity of Iranian intermediate EFL learners?

In this study part, an effort was made to examine whether all the participants were at the same level of language proficiency. The results are provided in Table 1 for the pre-test scores and 2 for the past-test stage. First, to certify the comparability of writing complexity of the control and experimental groups in terms of four variables of *left embeddedness before the main verb, Minimal Edit distance in part of speech, syntax similarity, and the number of modifiers per noun phrase* (four selected variables in Coh-Metrix software), the pre-test scores of all three groups were compared in Table 1.

Table 1. *Descriptive Statistics for the Pre-test Scores of the Control and Experimental Groups*

Groups	**Modality**	**Complexity Variables**			
		Left Embeddedness (Mean)	Minimal Edit Distance (Mean)	Syntax Similarity (Mean)	Number of Modifiers (Mean)
Control	Video	2.42	0.58	0.14	0.66
	Podcast	2.42	0.64	0.13	0.50
	Picture	2.46	0.40	0.11	0.72
Synchronous (WhatsApp)	Video	2.85	0.49	0.15	0.57
	Podcast	2.40	0.63	0.17	0.57
	Picture	2.77	0.41	0.12	0.77
Asynchronous (Email)	Video	2.45	0.58	0.12	0.57
	Podcast	2.04	0.57	0.13	0.60
	Picture	2.33	0.64	0.14	0.71

As Table 1 shows, the highest mean in all three groups is for the left embeddedness variable in the video writing task (M= 2.85), which is for the synchronous experimental group and the lowest mean is for the syntax similarity variable of the picture writing task in the control group (M= 0.11). For other variables, equal or similar ratios are reported in Table 1. The descriptive statistics for the post-test scores are indicated in Table 2.

Table 2. *Descriptive Statistics for the Post-test Scores of the Control and Experimental*

Groups	**Modality**	**Complexity Variables**			
		Left Embeddedness (Mean)	Minimal Edit Distance (Mean)	Syntax Similarity (Mean)	Number of Modifiers (Mean)
Control	Video	2.33	0.59	0.13	0.63
	Podcast	2. 37	0.63	0.14	0.51
	Picture	2.36	0.41	0.13	0.70
Synchronous	Video	2.96	0.53	0.15	0.43
	Podcast	2.56	0.48	0.12	0.32
	Picture	3.12	0.27	0.20	0.56
Asynchronous	Video	2.47	0.70	0.12	0.48
	Podcast	2.23	0.48	0.10	0.36
	Picture	2.60	0.47	0.16	0.46

As indicated in Table 2, the highest mean in post-test scores is for the *left embeddedness* picture writing task in the synchronous experimental group (M= 3.12), and the lowest for the podcast writing task syntax similarity in the asynchronous group (M= 0.10).

The effects of synchronous and asynchronous multimodal scaffolding on intermediate EFL learners' freewriting were compared. To assure any statistically significant differences between any two groups, a post hoc test was run based on the *number of modifier*s in video writing, *minimal edit distance*, and the *number of modifiers* in podcast writing, *minimal edit distance*, and *the number of modifiers* in picture writing. The results are presented in Table 3.

Table 3. *Independent- Samples T-test for the Means of Gain Scores Experimental Groups for Minimal Edit Distance and Number of Modifiers*

Modality	Variable	Groups	Sig.
Video	Number of Modifiers	Control- Synchronous	.01
		Control- Asynchronous	.04
		Synchronous- Asynchronous	.49
Podcast	Minimal Edit Distance	Control- Synchronous	.00
		Control- Asynchronous	.00
		Synchronous- Asynchronous	.97
Podcast	Number of Modifiers	Control- Synchronous	.00
		Control- Asynchronous	.00
		Synchronous- Asynchronous	.55
Picture	Minimal Edit Distance	Control- Synchronous	.02
		Control- Asynchronous	.00
		Synchronous- Asynchronous	.34
Picture	Number of Modifiers	Control- Synchronous	.01
		Control- Asynchronous	.01
		Synchronous- Asynchronous	.34

Note: The mean difference is significant at the .05 level.

The results indicated no significant differences between synchronous and asynchronous multimodal scaffolding. Thus, the first research hypothesis is rejected.

RQ2: Is there any significant difference between male and female's tendency towards using multimodal scaffolding?

With respect to the second research question, learners' responses of both the synchronous and asynchronous experimental groups in the questionnaire and structured interview were collected to investigate the second research hypothesis. Moreover, Cronbach's alpha test was utilized to examine the reliability of the questionnaire. If the results of Cronbach's alpha are above 0.75, we can conclude that the reliability is excellent, and when the result is between 0.5 and 0.75, the reliability is good. Nevertheless, the reliability is not acceptable if the result is below 0.5. The results of Cronbach's alpha ($\alpha = .87$) indicate that the questionnaire is reliable.

Furthermore, a nonparametric test is applied to scrutinize the difference between the mean of males and females. The Results are shown in Table 4.

Table 4. Mann-*Whitney U test for Males' and Females' Attitude towards Multimodal Scaffolding*

	General Issues	Tasks	Percentage	General Options	Sum Total
Mann-Whitney U	246.00	317.50	237.50	353.50	266.50
Wilcoxon W	652.00	723.50	643.50	759.50	672.50
Z	-2.39	-1.22	-2.55	-.634	-2.05
Sig. (2-tailed)	.016	.22	.01	.526	.040

According to Table 4, the notion of similarity between male and female opinions according to Total Questions, Percentage, and General Issues is denied, and it was discovered that there is a significant difference between male and female viewpoints. Therefore, the second research hypothesis is rejected.

5. Discussion

The present study showed no significant differences between synchronous and asynchronous modes. The evaluation of the writing complexity of learners regarding the variables of the *number of modifiers per noun phrase* in three modes including, picture, podcast, and video of the writing tasks and *minimal edit distance* in picture and podcast writing tasks indicated that the synchronous group did not outperform the asynchronous group.

The present study's findings align with the results of Ajabshir's (2019) who tried to discover the effect of CMC on the need for speech act acquisition compared to traditional face-to-face (F2F) instruction. No difference was found between synchronous and asynchronous groups' performance. Likewise, Hrastinskin (2008) examined the advantages and limitations of synchronous and asynchronous environments. He found that the two environments complement each other, which means a combination of these two modes can provide learners with several ways to learn.

In contrast, some research supported synchronous communications as it involves immediate interactions (Son, 2008). Li and Zhu (2017) found that technology is ineffective in improving learners' output since co-responsibility for writing does not exist. It was discussed that peer scaffolding declines due to a lack of co-responsibility and can negatively affect the writing task. The most likely causes are that both modes have advantages and assist learners in communicating and efficient learning. Each of these modes can be suitable for a specific situation. Synchronous mode provides the situation for participants to be engaged at the same time, and they can experience concurrent interactions with their teacher or classmates. On the other hand, asynchronous mode provides the opposite situation. Although there are no real-time interactions in an asynchronous environment, participants can take their time to think and prepare their contents. Learners can have their schedules in asynchronous mode, and participants do not need to log in simultaneously.

Furthermore, the results of the questionnaire revealed that males' and females' attitudes towards applying multimodal scaffolding differ significantly. It was discovered that 90% of female learners favor online applications for future writing courses. It might be related to the

fact that WhatsApp and email are closely connected with our daily activities, and students are familiar with and attracted to these technologies (Selcuk et al., 2019; Zhang et al., 2014). In addition, they believed multimodal scaffolding improved their writing. Only one female participant expressed her disapproval of collaborative writing and believed it was inefficient. She mentioned that her classmates hardly answered her questions and this lack of co-responsibility negatively influenced her. Conversely, 60% of male students were against online collaboration. Although they found this form of writing helpful, they preferred face-to-face communication. Additionally, they mentioned it was an exciting experience for them, but will not use it in the future since they do not consider multimodal scaffolding practical enough to improve their writing skills. One possible reason might be that they have not technology to accomplish their writing tasks before. Hence, insufficient application may bring about negative perceptions which impedes English language learning.

These results confirm the benefits of both synchronous and asynchronous CMC (e.g., Ene & Upton, 2018; Nippard, 2005). Moreover, the results of this study also support the previous studies that provided evidence that gender perceptions differ regarding technology application in EFL (e.g., Siddiq & Scherer, 2019). Meanwhile, the present study added to the previous literature by providing evidence for the effectiveness of employing multimodal scaffolding in synchronous and asynchronous environments. It should be mentioned that the benefits of synchronous and asynchronous in the current study can be attributed to how collaborative writing tasks were designed and operationalized. Both synchronous and asynchronous environments in freewriting collaborative tasks benefited learners, during which multimodal scaffolding was applied.

6. Conclusion

Some main conclusions can be drawn from the findings of the present investigation. First, the statistical analysis of the data revealed no significant difference between synchronous and asynchronous multimodal scaffolding. Both CMC modes significantly affected learners' writing complexity of EFL learners. Furthermore, the results prove that males' and females' perceptions of integrating CMC in EFL classrooms were differed significantly. The post-treatment questionnaire and the structured interview indicated that females had more positive views toward using WhatsApp and Email than males.

The study results contribute to theoretical advancements and practical implications in the educational application of CMC. We add to the literature that synchronous and asynchronous modes are equally beneficial in EFL writing classes and improve learners' complexity writing as learners are assisted through multimodality. Thus, these online and offline communications provide learners with opportunities to produce more grammatically complicated writing. The study's findings align with Pineda Hoyos' (2018) research in which the compelling nature of CMC activities was proved. Providing more collaborative tasks for learners is believed to improve their academic accomplishment (Slof et al., 2021). All in all, EFL teachers are suggested to include various synchronous and asynchronous tools in their writing classes to optimize learning and enrich the educational settings by providing multimodal resources to encourage learners to communicate in collaborative tasks and take advantage of various online resources. Considering the nature of asynchronous and synchronous modes, a combination of

both can benefit the learners and the teachers. The current study indicated that although digital tools can be distractors (Cao & Tian, 2020; Lee & Lee, 2022), Learners interact more in the technology-based environment since they can hide their identity (AbuSeileek, 2012). Thus, this study provided some novel insights into the value of CMC modes in EFL writing classes. The findings of this study should be cautiously interpreted since it suffers from several limitations. The results of this study are not generalizable to other contexts as it was situated in a F2F EFL course in a language institute. Another remarkable limitation of this study is the relatively small number of participants in each experimental group. Moreover, this study did not investigate other grammatical features in writing complexity which might result in different results. More importantly, discussing some of the study's discoveries, such as those resulting from the responses to interview questions, is based on the participants' subjective answers and can be impressionistic. In addition, in the current study, collaborative writing equals CMC collaborative writing, and other potentially beneficial devices can be utilized as a mediator in future research. In future studies, it would be interesting to investigate other social networking applications, such as Facebook or Instagram. It would also be possible to conduct a more significant number of students over a more prolonged period. Moreover, the effect of different interactive patterns utilized by learners while doing collaborative tasks can be considered in future studies

References

Abe, M. (2021). L2 interactional competence in asynchronous multiparty text- based communication: study of online collaborative writing. *Computer Assisted Language Learning*, 34(4), 409-433. https://doi.org/10.1080/09588221.2019.1614070

Abrams, Z. I. (2003). The effect of synchronous and asynchronous CMC on oral performance in German. Modern Language Journal, 87(2), 157–167. https://doi.org/10.1111/1540-4781.00184

An, Y., & Frich, T. (2006). Students' perceptions of synchronous computer-mediated communication in face-to-face courses. *Computer-mediated communication*, 11(20), 211-234. https://doi.org/10.1111/j.1083-6101.2006.00023.x

AbuSeileek, A. (2012). The effect of computer assisted cooperative learning method and group size on EFL learners' achievement in communication skills. *Computers and Education*, 58(1). 231-239. https://doi.org/10.1016/j.compedu.2011.07.011

Ackerman, J. M. (1993). The promise of writing to learn. *Written Communication*, 10(3). 334–370. https://doi.org/10.1177/0741088393010003002

Ajabshir, Z. (2019). The effect of synchronous and asynchronous computer-mediated communication (CMC) on EFL learners' pragmatic competence. *Computers in Human Behavior*, 92, 169-177. https://doi.org/10.1016/j.chb.2018.11.015

Bailey, D., Almusharraf, N., & Hatcher, R. (2021). Finding Satisfaction: Intrinsic Motivation for Synchronous and Asynchronous Communication in the Online Language Learning Context. *Education and Information Technologies*, 26, 2563-2583. https://doi.org/10.1007/s10639-020-10369-z

Bhowmik, S. K., Hilman, B., & Roy, S. (2019). Peer collaborative writing in the EAP classroom: Insights from a Canadian postsecondary context., *TESOL Journal* 10(2), 1-16. https://doi.org/10.1002/tesj.393

Bikowski, D., & Vithanage, R. (2016). Effects of web-based collaborative writing on individual L2 writing development. *Language Learning & Technology*, 20, 79–99. http://llt.msu.edu/issues/february2016/bikowskivithanage.pdf

Cao, G. M., & Tian, Q. F. (2020). Social media use and its effect on university student's learning and academic performance in the UAE. *Journal of Research on Technology in Education*, 54(1), 18–33. https://doi.org/10.1080/15391523.2020.1801538

Cha, Y. Kim, N., & Kim, H-S. (2022). Effects of EFL Learners' Perspectives on Online English Classes: Gender, Major, and Proficiency. *Journal of English Teaching through Movies and Media*, 23(1), 42-57. https://doi.org/10.16875/stem.2022.23.1.42

Chanlin, L. J. (2001). The effects of gender and presentation format in computer-based learning. *Educational Media International*, 38(1), 61–65. https://doi.org/10.1080/09523980010021244

Cho, H. (2017). Synchronous web-based collaborative writing: factors mediating interaction among second-language writers. *Journal of Second Language Writing*, 36, 37-51. https://doi.org/10.1016/j.jslw.2017.05.013

Choi, J. (2002). The role of online collaboration in promoting ESL writing. *English Language Teaching*, 1(1), 34-49. https://doi.org/10.5539/ELT.V1N1P34

Crosthwaite, P., Hutchison, S., Wijayatilake, C., & Souza. N. (2017). *Mindset for IELTS*. Cambridge University Press.

Darhower, M. (2002). Interactional features of synchronous computer-mediated communication in the intermediate L2 class: A sociocultural case study. *CALICO Journal*, 19(2), 249-277. http://www.jstor.org/stable/24149361

De Freitas, S., & Neumann, T. (2009). Pedagogic strategies supporting the use of synchronous audiographic conferencing: A review of the literature. British Journal of Educational Technology, 40(6), 980–998. http://dx.doi.org/10.1111/j.1467-8535.2008.00887.x

Dobao, A. F. (2012). Collaborative writing tasks in the L2 classroom: Comparing group, pair, and individual work. *Journal of Second Language Writing*, 21, 40–58.

Ene, E., & Upton, T. (2018). Synchronous and asynchronous teacher electronic feedback and learner uptake in ESL composition. *Journal of Second Language Writing*, 41, 1-13. https://doi.org/10.1016/j.jslw.2018.05.005

Fernández-Fontecha, A., O'Halloran, K, L., Wignell, P., & Tan, S. (2020). Scaffolding CLIL in the science classroom via visual thinking: A systemic functional multimodal approach. *Linguistics and Education, 55*, 1-10. http://dx.doi.org/10.1016/j.linged.2019.100788

Ferrari, F., Picciuolo, D. & Bigi, D. (2022). Improving text comprehension in ESL learners: a multichannel approach. *Innovation in Language Learning and Teaching*, 16(1), 82-102, htpps://doi: 10.1080/17501229.2020.1868477

Graesser, A. C., & McNamara, D. S. (2011). Computational analyses of multilevel discourse comprehension. *Topics in Cognitive Science*, 3(2), 371-398. https://doi.org/10.1111/j.1756-8765.2010.01081.x

Hashemi, A., Si Na, K., Noori, A., & Orfan, S. (2022). Gender differences on the acceptance and barriers of ICT use in English language learning: Students' perspectives. *Cogent Arts & Humanities*, 9(1), htpps://doi: 10.1080/23311983.2022.2085381

Hrastinski, S. (2008). The potential of synchronous communication to enhance participation in online discussions: A case study of two e-learning courses. *Information & Management*, 45(7), 499-506. https://doi.org/10.1016/j.im.2008.07.005

Hrastinski, S., & Keller, C. (2007). Computer-mediated communication in education: A review of recent research. *Educational Media International*, 44(1), 61–77.

Huffman, S, R. (2010). Using mobile technologies for synchronous CMC to develop L2 oral proficiency. In. J. Levis & K. LeVelle (Eds.). *Proceedings of the 2nd Pronunciation in Second Language Learning and Teaching Conference.* (pp. 122-129)

Hyde, J. S., Lindberg, S. M., Linn, M. C., Ellis, A. B., & Williams, C. C. (2008). Gender similarities characterize math performance. *Science*, 321, 494-495. https://doi.org/10.1126/science.1160364

Jiang, L. (2018). Digital multimodal composing and investment change in learners' writing in English as a foreign language. *Journal of second language writing*, 40(2018), 60–72. https://doi.org/10.1016/j.jslw.2018.03.002

Jiang. W., & Eslami. Z. (2021). Effects of computer-mediated collaborative writing on individual EFL writing performance. *Computer Assisted Language Learning*. https://doi.org/10.1080/09588221.2021.1893753

Johnson, S. D., & Aragon, S. R. (2003). An instructional strategy framework for online learning environments. *New directions for adult and continuing education*, 2003(100), 31-43. https://doi.org/10.1002/ace.117

Kessler, G., Bikowski, D., & Boggs, J. (2012). Collaborative writing among second language learners in academic web-based projects. *Language Learning & Technology*, 16(1), 91–109.

Khalil, Z. M. (2018). EFL students' perceptions towards using Google Docs and Google Classroom as online collaborative tools in learning grammar. *Applied Linguistics Research Journal*, 2(2), 33-48. https://doi: 10.14744/alrj.2018.47955

Kim, N. Y. (2019). Effects of gender difference on English learning with technology. *Journal of the Korea AcademiaIndustrial Cooperation Society*, 20(8), 403-416. https://doi.org/10.5762/KAIS.2019.20.8.403

Kress, G. (2010). *Multimodality: a social semiotic approach to contemporary communication.* Routledge.

Kress, G., (2003). *Literacy in the New Media Age*. Routledge.

Kuyath, S. (2008). *The social presence of instant messaging: Effects on student satisfaction, perceived learning, and performance in distance education* [Doctoral Dissertation, University of North Carolina at Charlotte].

Lee, P. S., & Lee, C. M. (2022). Are South Korean college students benefitting from digital learning? *International Journal of Human-Computer Interaction*, 1–12. https://doi.org/10.1080/10447318.2022.2047319

Li, M., & Zhu, W. (2017). Good or bad collaborative wiki writing: Exploring links between group interactions and writing products. *Journal of Second Language Writing*, 35, 38-53. https://doi.org/10.1016/j.jslw.2017.01.003

Li, W. Zhang, X., & Lu, X. (2022). Beyond differences: Assessing effects of shared linguistic features on L2 writing quality of two genres. *Applied Linguistics*, 43(1), 168-195.

Liu, J., Sadler, R. (2003). The effects and effect of peer review in electronic versus traditional modes on L2 writing. *Journal of English for Academic Purposes*, 2, 193-227. http://dx.doi.org/10.1016/S1475-1585(03)00025-0

Luik, P. (2011). Would boys and girls benefit from gender-specific educational software? *British Journal of Educational Technology*, 42(1), 128–144. https://doi.org/10.1111/j.1467-8535.2009.01005.

McNamara, D., Graesser, P., McCarthy, M., & Cai, Z., (2014). *Automated Evaluation of Text and Discourse with Coh-Metrix*. Cambridge University Press. https://doi.org/10.1017/CBO9780511894664

Mabrito, M. (2006). A study of synchronous versus asynchronous collaboration in an online business writing class. *The American Journal of Distance Education*, 20(2), 93–107. https://doi.org/10.1207/s15389286ajde2002_4

Nippard, E. C. (2005). *Social presence in the web-based synchronous secondary classroom* (Doctoral dissertation, Memorial University of Newfoundland). https://doi:10.19173/irrodl.v7i1.317

Murray, D. (2012). Protean communication: The language of computer-Mediated communication. *TESOL Quarterly*, 34(3) 397-421. https://doi.org/10.2307/3587737

Odisho, E. (2007). *Linguistic Tips for Latino Learners and Teachers of English*. Gorgias Press.

Pacheco, M. B., Smith, B. E., Deig, A., & Amgott, N. A. (2021). Scaffolding Multimodal Composition with Emergent Bilingual Students. *Journal of Literacy Research*, 53(2), 149–173. https://doi.org/10.1177/1086296X211010888

Pérez, L. (2003). Foreign language productivity in synchronous versus asynchronous computer-mediated communication. *CALICO Journal*, 21(1), 89-104. https://www.jstor.org/stable/24149482

Perveen, A. (2016). Synchronous and Asynchronous E-Language Learning: A Case Study of Virtual University of Pakistan. *Open Praxis*, 8(1), 21-39. https://www.learntechlib.org/p/171556/

Pickering, M., & Garrod, S. (2006). Alignment as the basis for successful communication. *Research on Language and Computation*, 4, 203-228. https://doi.org/10.1007/s11168-006-9004-0

Pineda Hoyos, J. E. (2018). Error correction and repair moves in synchronous learning activities. *Int J Educ Technol High Educ*, 15, 23. https://doi.org/10.1186/s41239-018-0105-2

Puri, G. (2012). Critical success factors in E-learning – An empirical study. *International Journal of Multidisciplinary Research*, 2(1), 149-161.

Rourke, L., & Kanuka, H. (2009). Learning in communities of inquiry: A review of the literature. *Journal of Distance Education*, 23, 19–48. https://www.learntechlib.org/p/105542/.

Salas, S., Garson, K., Kanna, S., & Murray, B. (2016). Using free writing to make sense of literature. *English Teaching Forum*, 54(2). 12-18.

Salmon, G. (2013). *E-tivities: The key to active online learning*. Routledge. https://doi.org/10.4324/9780203074640

Selcuk, H., Jones, J., & Vonkova, H. (2019). The emergence and influence of group leaders in web-based collaborative writing: Self-reported accounts of EFL learners. *Computer Assisted Language Learning*,34(8). 1–21. https://doi:10.1080/09588221.2019.1650781

Shuell, T., & Farber, S. (2001). Students' perceptions of technology use in college courses. Journal of Educational Computing Research, 2(24), 119-138. https://doi.org/10.2190/YWPN-H3DP-15LQ-QNK8

Siddiq, F., & Scherer, R. (2019). Is there a gender gap? A meta-analysis of the gender differences in students' ICT literacy. *Educational Research Review*, 27(2018), 205–217. https://www.sciencedirect.com/science/article/pii/S1747938X18302902

Slof, B., van Leeuwen, A., Janssen, J., & Kirschner, P. A. (2021). Mine, ours and yours, whose engagement and prior knowledge affects individual achievement from online collaborative learning? *Journal of Computer Assisted Learning*, 37(1), 39–50. https://doi.org/10.1111/jcal.12466

Son, J. B. (2008). Using Web-based language learning activities. *Computer Assisted Language Learning*, 4(4), 34–43. https://doi.org/10.5172/ijpl.4.4.34

Sotillo, S. (2000). Discourse functions and and syntactic complexity in synchronous and asynchronous communication. *Language Learning and Technology*, 4(1), 82-119. https://www.learntechlib.org/p/88512/.

Strobl, C. (2014). Affordances of Web 2.0 technologies for collaborative advanced writing in a foreign language. *CALICO Journal*, 31(1), 1–18. https:// doi:10.11139/cj.31.1.1-18

Sze Seau, L., & Azman, H. (2020). Introducing a Responsive Multimodal Oral Presentation Pedagogy: Integrating TED Videos with Web 2.0, Collaborative Learning and Teacher Feedback. *RELC Journal*. https://doi.org/10.1177/0033688220945426

Tang, K-S., Delgado, C., & Moje, E. B. (2014). An integrative framework for the analysis of multiple and multimodal representations for meaning-making in science education. *Science Education*, 98(2), 305–326. htpps://doi: http://dx.doi.org/10.1002/sce.21099

Tolu, A. T. (2010). *An exploration of synchronous communication in an online preservice ESOL course: Community of inquiry perspective* [Doctoral Dissertation, University of South Florida]. https://digitalcommons.usf.edu/etd/3707

Tsai, M. J., & Tsai, C. C. (2010). Junior high school students' Internet usage and self-efficacy: A re-examination of the gender gap. *Computers and Education*, 54(4), 1182–1192. https://doi.org/10.1016/j.compedu.2009.11.004

Vygotsky. L. S. (1986). *Thought and language*. MIT Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Yasuda, R. (2022). Fluency development through freewriting and transfer to other more structured tasks. *Language Teaching Research*, 0(0), 1-10. https://doi.org/10.1177/13621688221084899

Yates, S. J. (2001). Gender, language and CMC for education. *Learning and Instruction*, 11, 21–34.

Zhang, H., Song, W., Shen, S., & Huang, R. (2014). The effects of blog-mediated peer feedback on learners' motivation, collaboration, and course satisfaction in a second language writing course. *Australasian Journal of Educational Technology*, 30(6), 670–685. https://doi:10.14742/ajet.860

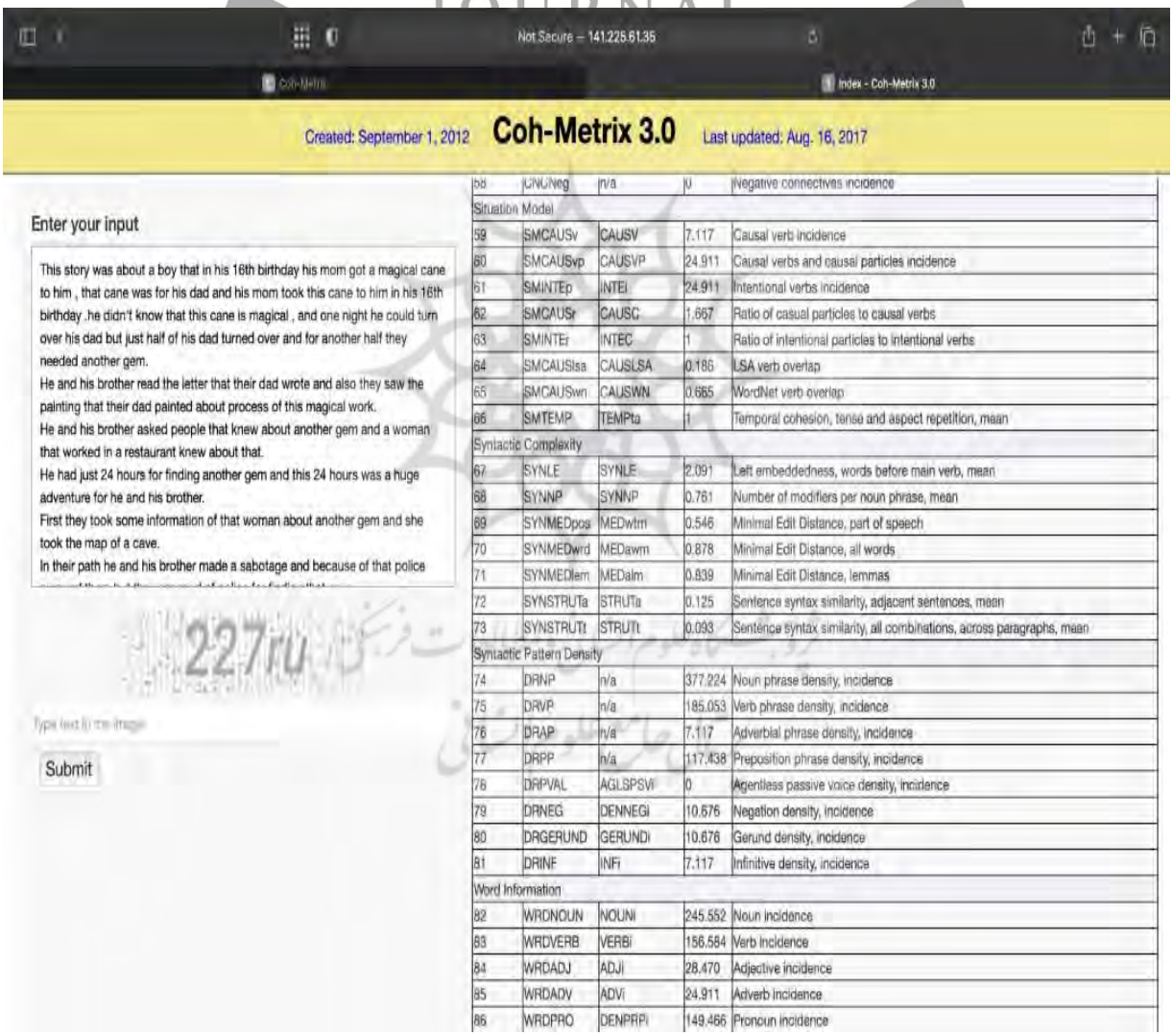
Zhang, M. (2018). Collaborative writing in the EFL classroom: The effects of L1 and L2 use. *System*, 76, 1-12. https://doi.org/10.1016/j.system.2018.04.009

Appendix A

Interview

1. Did you enjoy doing the tasks using media tools (WhatsApp or Email)?
2. Did you feel comfortable doing the tasks using media tools?
3. Will you use WhatsApp or email for completing writing tasks again in future?
4. Did media tools influence your group's collaborative experience?
5. Are media tools useful tools for learning writing?
6. Was it easy to use WhatsApp or email for doing writing tasks?
7. Did media tools help you to improve your writing performance?
8. What do you think of general using media tools in writing classes?

Appendix B Video scoring



58	CNCNeg	n/a	0	Negative connectives incidence
Situation Model				
59	SMCAUSv	CAUSV	7.117	Causal verb incidence
60	SMCAUSvp	CAUSVP	24.911	Causal verbs and causal particles incidence
61	SMINTEp	INTEi	24.911	Intentional verbs incidence
62	SMCAUSr	CAUSC	1.667	Ratio of casual particles to causal verbs
63	SMINTEr	INTEC	1	Ratio of intentional particles to intentional verbs
64	SMCAUSlsa	CAUSLSA	0.186	LSA verb overlap
65	SMCAUSwn	CAUSWN	0.665	WordNet verb overlap
66	SMTEMP	TEMPta	1	Temporal cohesion, tense and aspect repetition, mean
Syntactic Complexity				
67	SYNLE	SYNLE	2.091	Left embeddedness, words before main verb, mean
68	SYNNP	SYNNP	0.761	Number of modifiers per noun phrase, mean
69	SYNMEDpos	MEDwtm	0.546	Minimal Edit Distance, part of speech
70	SYNMEDwrd	MEDawm	0.878	Minimal Edit Distance, all words
71	SYNMEDlem	MEDalm	0.839	Minimal Edit Distance, lemmas
72	SYNSTRUTa	STRUTa	0.125	Sentence syntax similarity, adjacent sentences, mean
73	SYNSTRUTt	STRUTt	0.093	Sentence syntax similarity, all combinations, across paragraphs, mean
Syntactic Pattern Density				
74	DRNP	n/a	377.224	Noun phrase density, incidence
75	DRVP	n/a	185.053	Verb phrase density, incidence
76	DRAP	n/a	7.117	Adverbial phrase density, incidence
77	DRPP	n/a	117.438	Preposition phrase density, incidence
78	DRPVAL	AGLSPSVI	0	Agentless passive voice density, incidence
79	DRNEG	DENNEGi	10.676	Negation density, incidence
80	DRGERUND	GERUNDi	10.676	Gerund density, incidence
81	DRINF	INFi	7.117	Infinitive density, incidence
Word Information				
82	WRDNOUN	NOUNi	245.552	Noun incidence
83	WRDVERB	VERBi	156.584	Verb incidence
84	WRDADJ	ADJi	28.470	Adjective incidence
85	WRDADV	ADVi	24.911	Adverb incidence
86	WRDPRO	DENPRPi	149.466	Pronoun incidence

Appendix C Picture Scoring

65	SMCAUSwn	CAUSWN	0.791	WordNet verb overlap
66	SMTEMP	TEMPta	1	Temporal cohesion, tense and aspect repetition, mean
Syntactic Complexity				
67	SYNLE	SYNLE	3.182	Left embeddedness, words before main verb, mean
68	SYNNP	SYNNP	0.705	Number of modifiers per noun phrase, mean
69	SYNMEDpos	MEDwtm	0.507	Minimal Edit Distance, part of speech
70	SYNMEDwrd	MEDawm	0.809	Minimal Edit Distance, all words
71	SYNMEDlem	MEDalm	0.791	Minimal Edit Distance, lemmas
72	SYNSTRUTa	STRUTa	0.266	Sentence syntax similarity, adjacent sentences, mean
73	SYNSTRUTt	STRUTt	0.198	Sentence syntax similarity, all combinations, across paragraphs, mean
Syntactic Pattern Density				
74	DRNP	n/a	351.351	Noun phrase density, incidence
75	DRVP	n/a	236.486	Verb phrase density, incidence
76	DRAP	n/a	40.541	Adverbial phrase density, incidence
77	DRPP	n/a	155.405	Preposition phrase density, incidence
78	DRPVAL	AGLSPSVI	81.081	Agentless passive voice density, incidence
79	DRNEG	DENNEGI	0	Negation density, incidence
80	DRGERUND	GERUNDI	27.027	Gerund density, incidence
81	DRINF	INFi	0	Infinitive density, incidence
Word Information				
82	WRDNOUN	NOUNi	283.784	Noun incidence
83	WRDVERB	VERBi	114.865	Verb incidence
84	WRDADJ	ADJi	47.297	Adjective incidence
85	WRDADV	ADVi	33.784	Adverb incidence
86	WRDPRO	DENPRPi	54.054	Pronoun incidence
87	WRDPRP1s	n/a	0	First person singular pronoun incidence
88	WRDPRP1p	n/a	20.270	First person plural pronoun incidence
89	WRDPRP2	PRO2i	0	Second person pronoun incidence
90	WRDPRP3s	n/a	0	Third person singular pronoun incidence
91	WRDPRP3p	n/a	27.027	Third person plural pronoun incidence
92	WRDFRQc	FRCLacwm	1.890	CELEX word frequency for content words, mean
93	WRDFRQa	FRCLaswm	2.903	CELEX Log frequency for all words, mean
94	WRDFRQmc	FRCLmcsm	0.865	CELEX Log minimum frequency for content words, mean

Appendix D Podcast Scoring

Enter your input

This listening speaks about Rita and Jon. They speak about first orientation week in the university. Rita says: we can find friends and our way around university with many different events. Jon says: he went on walking tour of the city on his first day in the university. Some students got a bus tour. Rita decided to sign up for getting bike but she got last place,so she hired it from a little cycle hire shop on Barkway street. She spelled Barkway street for Jon . She could choose a traditional's bike or an electric's bike. Jon likes to take an electric bike.Rita says him it is better for you because it wasn't too expensive. The cycle hire was only $120 for the whole group and it was for three hours and it was $15 per person. It was cheap and they could park their bikes easily. Rita gives the website address of the place where she got her bike from;It is tradelectric.com. Rita likes to go to the harbour next time.

Type text in the image

Submit

66	SMTEMP	TEMPla	0.833	Temporal cohesion, tense and aspect repetition, mean
Syntactic Complexity				
67	SYNLE	SYNLE	1.308	Left embeddedness, words before main verb, mean
68	SYNNP	SYNNP	0.759	Number of modifiers per noun phrase, mean
69	SYNMEDpos	MEDwtm	0.710	Minimal Edit Distance, part of speech
70	SYNMEDwrd	MEDawm	0.879	Minimal Edit Distance, all words
71	SYNMEDlem	MEDalm	0.848	Minimal Edit Distance, lemmas
72	SYNSTRUTa	STRUTa	0.138	Sentence syntax similarity, adjacent sentences, mean
73	SYNSTRUTt	STRUTt	0.123	Sentence syntax similarity, all combinations, across paragraphs, mean
Syntactic Pattern Density				
74	DRNP	n/a	403.409	Noun phrase density, incidence
75	DRVP	n/a	210.227	Verb phrase density, incidence
76	DRAP	n/a	5.682	Adverbial phrase density, incidence
77	DRPP	n/a	113.636	Preposition phrase density, incidence
78	DRPVAL	AGLSPSVI	0	Agentless passive voice density, incidence
79	DRNEG	DENNEGI	5.682	Negation density, incidence
80	DRGERUND	GERUNDi	11.364	Gerund density, incidence
81	DRINF	INFi	17.045	Infinitive density, incidence
Word Information				
82	WRDNOUN	NOUNI	267.046	Noun incidence
83	WRDVERB	VERBi	164.773	Verb incidence
84	WRDADJ	ADJI	90.909	Adjective incidence
85	WRDADV	ADVI	22.727	Adverb incidence
86	WRDPRO	DENPRPI	125	Pronoun incidence
87	WRDPRP1s	n/a	0	First person singular pronoun incidence
88	WRDPRP1p	n/a	11.364	First person plural pronoun incidence
89	WRDPRP2	PRO2I	5.682	Second person pronoun incidence
90	WRDPRP3s	n/a	51.136	Third person singular pronoun incidence
91	WRDPRP3p	n/a	17.045	Third person plural pronoun incidence
92	WRDFRQc	FRCLacwm	2.493	CELEX word frequency for content words, mean
93	WRDFRQa	FRCLaewm	3.149	CELEX Log frequency for all words, mean
94	WRDFRQmc	FRCLmcsm	1.040	CELEX Log minimum frequency for content words, mean
95	WRDAOAc	WRDAacwm	334.077	Age of acquisition for content words, mean