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The Effect of Collaborative Writing on Syntactic Complexity and Attitudes towards Writing in a Blended Learning Environment: A Quasi-Experimental Study

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ABSTRACT

Syntactic complexity is a reflection of a writer's proficiency. Research shows that an effective way to improve syntactic complexity is collaborative writing which is a group of learners sharing responsibility for a text they write together. The main goal of this study was to determine whether there is a significant difference between two different types of collaborative writing, individual-product and group-product, on learners' syntactic complexity. In addition, this study also measured the effect of collaborative writing on learners' attitudes and the possible effect of gender on syntactic complexity. In this quasi-experimental research, 34 male and female learners with a mean age of 20.94 were selected through purposive sampling. An OPT checked homogeneity and estimated the learners' proficiency at the B2 level. The participants were placed in two classes, a collaborative individual-product class and a collaborative group-product class, in a blended-learning environment. Inside the class, the learners used Google Docs on their laptops and phones in order to practice collaborative writing while being monitored by the teacher so that everyone could maintain social distancing. Outside the class, all the instructional materials were available to the learners through Telegram while the learners continued collaborative writing on their homework using Google Docs. The results of an analysis of covariance showed that the group-product class did significantly better on the post-test, however, there was no difference between the genders on syntactic complexity. Finally, both classes showed statistically significant improvement in their attitudes.

Keywords: *Syntactic Complexity, Collaborative Writing, Attitude, Blended Learning, Google Docs, Telegram*

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1. Introduction

Syntactic complexity is one of the most commonly investigated proxies of assessing the writing proficiency and quality in the field of the second language (L2) research (De Clercq & Housen, 2017; Housen & Kuiken, 2009; Lu, 2011). In the past 4 decades, syntactic complexity criteria have undergone various substantial studies so that standard, practical, and reliable measures can be established; moreover, much research has been conducted on the assessment and the description of learners' linguistic development in second language writing and their correlation to learners' proficiency levels (Ansarifar, Shahriari, & Pishghadam, 2018).

In previous studies, various measures have been frequently employed some of

which include the mean length of sentences, the mean length of clauses, the mean length of T-units, the sum of main paratactic and hypotactic clauses divided by the number of sentences which is called grammatical intricacy, the ratio of subordinate clauses, the simple sentence ratio and noun phrases which are regarded as a main syntactic complexity feature of advanced learners' writings (Jiang et al., 2019; Menke & Strawbridge, 2019; Parkinson & Musgrave, 2014; Biber, Gray, & Poonpon, 2011; Lu, 2011; Hunt, 1965).

Recently, some scholars have reached the consensus that syntactic complexity needs to be considered and studied as a multi-dimensional construct, and this multi-dimensional construct generally involves the following four

dimensions: length of the production unit, the degree of subordination, the degree of coordination, and the amount of phrasal sophistication (Menke & Strawbridge, 2019; Lu, 2017; Ai & Lu, 2013; Norris & Ortega, 2009). Deciding on which of these measures are the most applicable and suitable depends on two factors which are learner language proficiency and the focus of the researchers (Menke & Strawbridge, 2019). Several combinations of the mentioned measures have been applied in various studies to describe how learners elaborate more and expand their complexity according to developmental levels. In the early stages, via coordination learners “complexify” their language (Menke & Strawbridge, 2019; Bardovi-Harlig, 1992; Homburg, 1984; Ishikawa, 1995; Sharma, 1980) while intermediate learners increase their complexity levels through subordination (Menke & Strawbridge, 2019; Byrnes, Maxim, & Norris, 2010; Colombi, 2002). Elaboration within the clause is one of the features of writers in advanced levels achieved by increasing the number of words in phrases (Kyle & Crossley, 2018; Biber, Gray, & Poonpon, 2011; Byrnes et al., 2010)

One current trend in the research is the dynamic nature of syntactic complexity development (Verspoor, Schmid, & Xu, 2012). On the other hand, considering the learners’ currently reported general lack of writing instruction and textual discourse understanding (Sagnier, 2016), many foreign language programs at different universities implement tertiary level language and discourse instructions as a vital requirement for undergraduates (Menke & Strawbridge, 2019). In line with the mentioned trend Muriel Gallego (2019) found that collaborative writing is more effective on syntactic complexity of learners than traditional writing methods. Collaborative writing is practiced when “participants share responsibility for the intended written product” (Herder et al., 2020), and some of the mention-worthy advantages of collaborative writing are increasing accuracy (McDonough et al., 2018), increasing critical engagement (Vrikki et al., 2019), creating exploratory talk which is regarded as the most educationally effective type of discourse (Herder et al., 2020) and when accompanied by blended learning, learners will be able to use social media applications as a means to continue their discussions about complicated matters which were not resolved during face-to-face interactions and negotiations (Gentina & Chen, 2019). So far,

the literature is enriching at the level of describing how syntactic complexity changes over time with traditional non-collaborative-based classes (Menke and Strawbridge, 2019) and how syntactic complexity changes in traditional versus collaborative classes (Gallego, 2019). Nevertheless, the description of syntactic complexity development in relation to different types of collaborative classes is faced with a dearth of information; therefore, the present study attempts to objectively monitor the syntactic complexity development and attitudes of intermediate Iranian learners experiencing two different types of collaboration; individual-product collaboration and group-product collaboration in a blended learning environment.

2. Literature Review

Syntactic complexity is widely regarded as one of the most important constructs of assessing the writing quality in the field of the second language (L2) research (De Clercq & Housen, 2017; Housen & Kuiken, 2009; Lu, 2011). Consequently, during the last 4 decades, in order to evaluate the linguistic development of learners in L2 writing and to assess their writing proficiency, numerous studies have put substantial effort into establishing effective and reliable syntactic complexity “yardsticks” (Ansarifar, Shahriari, & Pishghadam, 2018). The importance of monitoring the syntactic complexity of learners is that generally, more complex language is connected with more developed and better language use, which reflects itself in utilizing higher level or later acquired structures (Menke & Strawbridge, 2019). So, by monitoring the syntactic complexity of learners in a course we may assess their approximate progress. The areas determining the complexity of language include syntactic units length, the type of inter-clausal relationships, and the variety of syntactic structures (Menke & Strawbridge, 2019).

The complexity measures regarding the length of syntactic units mostly consider the amount of elaboration, more words in a measure means more complexity. Length-based measures target sentences, clauses, and noun phrases. Length-based complexity measures, however, fail to provide useful measurement about the diversity and the nature of syntactic units’ relationship; therefore, complexity should also be examined by various inter-clausal relationships (Menke & Strawbridge, 2019).



Some subordinating measures have been derived from T-unit length. As an example, clauses per T-unit can be mentioned. So, one way to show the clausal relationships is by calculating the sum of subordinated clauses in a piece of writing, which is often shown as clauses per T-unit ([Menke & Strawbridge, 2019](#)). Wolfe-Quintero et al. (1998), discovered a connection between proficiency level and improved subordination which is shown by clauses per T-unit. Ortega (2003) also found a similar result and confirmed a remarkable 0.2 extent of change in clauses per T-unit. The mentioned change was assigned to both the increase and decrease of their syntactic units ([Menke & Strawbridge, 2019](#)).

In previous studies, various measures have been frequently employed some of which include the mean length of sentences, the mean length of clauses, and the ratio of subordinate clauses ([Hunt, 1965](#)). T-unit (the minimal terminable unit) length, however, is claimed to be a more influential measure of syntactic sophistication compared with other length-based measures ([Hunt, 1965](#)).

As it was mentioned above, the number of words per T-unit is a very commonly used measure. A T-unit is an independent clause together with all other dependent clauses and sub-clausal units attached to it ([Hunt, 1965](#)), and it is widely accepted that its length increases when the proficiency level of L1 and also L2 speakers improves. Moreover, it is more observable at lower levels (see [Gaies, 1980](#) for more information and explanation), so based on this fact we can assume that one of the most important factors for measuring the learners' progress lies in monitoring the length of learners' T-units. Bulté and Housen (2014) found that a group of upper-intermediate adult ESL learners succeeded in significantly growing the average length of their T-units after passing a short and intensive course; after four months their average length of T-units had nearly increased by one word. In their study, Wolfe-Quintero et al. (1998) claimed that proficiency level has a relatively direct relationship with the mean length of T-units. Ortega (2003), in another research synthesis, claimed that an approximately 3.3-word change is observable in the mean length of learners' T-units. Their reported 3.3-word change is based on a holistic rating criterion of proficiency which was applied in ESL studies. Jiang, Bi, and Liu (2019) realized that the mean length of T-units, the mean

length of sentences, and dependent clauses per clause, significantly differ between writings of varying levels of proficiency and they demonstrate higher effect sizes. Consequently, they can serve as more reliable measures of the writing proficiency of beginner and intermediate L2 English learners.

Halliday (1994) introduced a practical and objective measurement for inter-clausal relationships. Instead of categorizing dependent clauses based on their type and function, which could be adverbial, adjectival, or nominal, he made a distinction among clauses based on the level of their dependency. For instance, although hypotactic clauses are considered dependent clauses, they are not one of the constituents of the main clause. On the other hand, embedded clauses are also dependent clauses; however, they are dependent and integrated into their main clause. Consequently, Halliday claims that embedded clauses indicate higher inter-clausal relationships. Thus, in order to have a quantitative measure for analyzing it, he proposed grammatical intricacy (GI) and defined it as "the sum of main, paratactic (i.e., coordinate), and hypotactic clauses divided by the number of sentences" ([Menke & Strawbridge, 2019](#)). Since those pieces of writing which have a higher number of embedded clauses and fewer coordinate or hypotactic clauses have higher inter-clausal relationships ([Menke & Strawbridge, 2019](#)), their grammatical intricacy will be lower ([Menke & Strawbridge, 2019](#)). In another research done by Colombi (2002), it was realized that despite individual differences, grammatical intricacy decreases as the learners develop their academic register, and it might be fair to conclude that the more advanced the learners are the lower their grammatical intricacy will become. This does not, however, mean that an increase in grammatical intricacy is always a bad sign. A higher grammatical intricacy indicates that learners have lower subordination, and its interpretation depends on the starting level of learners. If the learners start at a deficient syntactic complexity level where they mainly use simple sentences, then an increase in grammatical intricacy is a good sign. At lower levels and the beginning stages of syntactic complexity development, grammatical intricacy may be more likely to change ([WolfeQuintero et al., 1998](#); [Bardovi-Harlig, 1992](#); [Homburg, 1984](#); [Ishikawa, 1995](#); [Sharma, 1980](#)) than inter-

clausal relationships ([Byrnes, Maxim, & Norris, 2010](#); [Colombi, 2002](#)).

Another common measure for capturing the nature of syntactic complexity is clauses per T-unit (CTU) which shows the overall amount of subordination. It was found by Wolfe-Quintero et al. ([1998](#)) that more proficient learners tend to use more subordination. It should not, however, be forgotten that other than proficiency level there are further factors that can affect subordination. These factors may be personal, regional, or even caused by the L1. As an example, Neff, Dafouz, Diez, Prieto, and Chaudron ([2004](#)) realized that a sample of Spanish learners who were learning English had higher levels of subordination in their writings than a sample of native English speakers. The writings of these Spanish learners who were learning English were also compared with a Spanish newspaper, and it was shown that they were similar in subordination levels. These findings can emphasize the fact that L1 transfer can affect syntactic complexity patterns (Ortega, [2015](#)). By dividing the number of simple sentences to complex and coordinated sentences, the simple sentence ratio is calculated which is another measure concerning the frequency or quantity of clause combining ([Menke & Strawbridge, 2019](#)). When more clauses combine the simple sentence ratio decreases. Moreover, Bulté and Housen ([2014](#)) stated that writing simple sentences repetitively in texts is a sign of lower writing quality.

Another measure of syntactic complexity is the variety of syntactic structures. It is important to consider additional measures to understand at which level elaboration is improving (phrasal, clausal, or inter-clausal). Recently, noun phrases have experienced some popularity as a main syntactic complexity feature of advanced learners' writings ([Biber, Gray, & Poonpon, 2011](#); [Lu, 2011](#); [Parkinson & Musgrave, 2014](#)). The phrasal complexity which indicates advanced L2 proficiency overlaps with some characteristics of academic writing, especially higher lexical density and lower grammatical intricacy ([Halliday, 1994](#)). Some apparent characteristics of academic texts are: "having a high concentration of nouns, nominalizations, attributive adjectives, and prepositional phrases" ([Menke & Strawbridge, 2019](#); [Biber, 1998, 2006](#); [Biber et al., 2011](#); [Biber, Gray, & Staples, 2016](#); [Halliday, 1994](#); [Lu, 2011](#); [Parkinson & Musgrave, 2014](#)). Consequently, nouns and

noun phrases are assumed to be central to academic writing. Since the phrasal level is above the intermediate level ([Norris & Ortega, 2009](#)), and the fact that our learners were approximately intermediate learners, this study assesses the mean length of T-units (MLTU), the mean length of clauses (MLC), grammatical intricacy (GI), clauses per T-unit (CTU), and the simple sentence ratio (SSR) all of which are taken from Menke & Strawbridge's ([2019](#)) study.

It is also worthy of mention that some of the latest syntactic complexity trends include describing the dynamic nature of syntactic complexity development ([Verspoor, Schmid, & Xu, 2012](#)), and highlighting their role for learners at lower levels of proficiency ([Ortega, 2015](#)). On the other hand, it is reported that learners currently suffer from a generally an inadequate amount of writing instruction ([Menke & Strawbridge, 2019](#)) and textual discourse understanding ([Sagnier, 2016](#)). In addition to researching the interaction quality and the effectiveness of tasks at improving language development, studies have also explored the relationship between collaborative writing and text quality and complexity. For example, the studies of Storch ([2005](#)) and Wigglesworth and Storch ([2009](#)) revealed that collaboration rendered positive results, and Fernández Dobao ([2012](#)) analyzed text complexity based on texts which were produced by individual learners, pairs, and small groups and found that the learners who worked in pairs or groups were able to produce more complex and accurate writings. Gallego ([2019](#)) and Menke and Strawbridge ([2019](#)) found the positive effect of collaboration on syntactic complexity. In an objective manner, the present study attempts to monitor the syntactic complexity development and attitudes of intermediate Iranian learners experiencing two different types of collaboration (individual-product and group-product) in a blended learning environment; where the teaching was done face-to-face and the students were allowed to collaborate both inside the class and online. The results may help teachers manage group work both in their classrooms and online.

2.1 Research Questions

The following main research questions guided the present study:

1. Is there a significant difference between the syntactic complexity of a collaborative individual-product class and a collaborative group-product class in a blended environment?



2. Does gender affect the syntactic complexity of a collaborative individual-product class and a collaborative group-product class in a blended environment?

3. Is there a significant difference between the attitudes of a collaborative individual-product class and a collaborative group-product class in a blended environment?

3. Methodology

3.1 Participants

The quasi-experimental study was conducted in a language learning Institute in Birjand, Iran. The participants were 40 male and female foreign language learners aged 18 - 24 years, with a mean age of 20.94 years old. Their mother tongue was Persian and English was the only foreign language that they were learning. Announcements for a writing class was made and volunteers were interviewed and assessed based on: being a university student, only learning English and not knowing any other languages other than Persian and English, having intermediate proficiency level (B2 on CEFR), having no previous academic writing courses, and being over 18 years old. The participants were selected from the volunteers through purposive sampling, and after that, they were randomly placed in two groups, namely an individual-product class (n=20) and a group-product class (n=20).

Their homogeneity was ensured through Oxford Placement Test. At the beginning, 20 learners were assigned to each group, but after running the homogeneity tests for the post-tests, it was observed that there were some absolute outliers among the learners. The outliers were determined and suggested by the SPSS software for having abnormally high performances. A total of 6 outliers were removed (3 from each class) resulting in two classes of 17 students. Although, this study is quantitative in nature expecting 30 participants in each group research has shown that in blended learning the ideal class size is 17 (Tomei, 2006; Tomei & Nelson, 2019) or 15.9 students (Orellana, 2006). Hence, the researchers decided to carry out the study with the 17 students that were appropriate for the study. In addition, the equal class size is recommended as protection against the effect of heterogeneity (e.g., Glass & Stanley, 1970; Hays, 1981; Keppel, 1991; Maxwell & Delaney, 1990; Winner, 1971).

3.2 Instruments

3.2.1 Proficiency test

The Oxford Placement Test is a standardized test from Oxford University

measuring English proficiency from A1 to C2 levels based on the Common European Framework of Reference for Languages (CEFR). The questions are 60 multiple-choice items. The highest score attainable on this test is 120 and the Cronbach Alpha of the test run in this study is .90.

3.2.2 The course book

The book; “Bailey, E. P., & Powell, P. A. (1989). *The practical writer with readings* (7th ed). Wadsworth: Cengage Learning” was the coursebook as it provides a manageable and accessible step-by-step approach to writing, from the one-paragraph essay to the five-paragraph essay. This book is widely used in Iran at the undergraduate level.

3.2.3 Pretest and post-test

The pretest and post-test of writing were writing tests which were selected from “Brook-Hart & Jakeman, (2011) and the results of the pretest were scored based on measures for length and inter-clausal relationships taken from Menke and Strawbridge’s study (2019).

Table 1 : Descriptive Statistics for the pretest

	Method	Mean	SD	N
MLC	Individual-Product	8.2838	.65938	17
	Group-Product	8.7288	1.00303	17
MLTU	Individual-Product	13.1024	3.08399	17
	Group-Product	14.4188	2.18400	17
CTU	Individual-Product	1.6212	.32342	17
	Group-Product	1.6782	.22476	17
GI	Individual-Product	2.3832	.92589	17
	Group-Product	2.0894	.44184	17
SSR	Individual-Product	.3600	.11885	17
	Group-Product	.4400	.15996	17

Table 2 Levene's test for pretest results

Levene Statistic	df1	df2	Sig.
2.942	1	32	.096

Table 3 Tests of Normality between individual-product and group-product Class

Method	Kolmogorov-Smirnov ^a		Shapiro-Wilk			
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest individual-product	.120	20	.200*	.953	20	.419
group-product	.188	20	.062	.928	20	.143

Table 4 ANOVA for pretest

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.888	1	21.888	1.47	.234
Within Groups	475.873	32	14.871		
Total	497.761	33			

3.2.4 Attitude questionnaire

A questionnaire about attitudes towards collaborative writing (Chen and Yu, 2019) estimated the attitudes towards collaborative writing using a 5-point scale ranging from 1 (low) to 5 (high). This questionnaire included three components: wanting to write alone, to write collaboratively, and whether the participant liked collaborative writing. The results of the first administration of the questionnaire at the beginning of the study are presented below.

Table 5: Frequency table regarding learners' attitudes on the pretest

		Method			
		individual-product		group-product	
		Count	Column N %	Count	Column N %
Willingness toward Collaborative Writing Pretest	very unfavorable	1	5.0%	3	15.0%
	Unfavorable	6	30.0%	4	20.0%
	Neutral	5	25.0%	7	35.0%
	Favorable	5	25.0%	3	15.0%
	very favorable	3	15.0%	3	15.0%
Willingness toward Individual Writing Pretest	very unfavorable	2	10.0%	0	0.0%
	Unfavorable	3	15.0%	2	10.0%
	Neutral	5	25.0%	7	35.0%
	Favorable	9	45.0%	6	30.0%
	very favorable	1	5.0%	5	25.0%
Willingness toward Having a Collaborative Writing Chance Pretest	very unfavorable	1	5.0%	3	15.0%
	Unfavorable	1	5.0%	4	20.0%
	Neutral	10	50.0%	5	25.0%
	Favorable	6	30.0%	5	25.0%
	very favorable	2	10.0%	3	15.0%

The repeated measures Kruskal-Wallis H test for the learners' attitudes was run and the results regarding the pretest (Table 6), $X^2(1, n = 40) = 0.01, p = 0.91$, on the learners' attitudes, indicate that at the beginning of the course there was no significant difference between learners' attitudes towards collaborative writing in general.

Table 6 Independent-Samples Kruskal-Wallis Test Summary on the pretest

Total N	40
Test Statistic	.012 ^{a,b}
Degree Of Freedom	1
Asymptotic Sig. (2-sided test)	.911

3.2.5 Measuring syntactic complexity

Syntactic complexity was measured based on a scale for length and inter-clausal relationships taken from Menke and Strawbridge's study (2019). The length-based measures are: mean length of clauses (the mean number of words in a clause) and the mean length of T-units (the mean number of words in a T-unit). The inter-clausal relationship measures are: clauses per T-unit (the mean number of clauses per T-unit), grammatical intricacy (the mean

number of clauses per sentence), and the simple sentence ratio (the ratio of simple sentences to the whole sentences of the essay). A sum of all the measures was also used in the analysis for a general syntactic complexity measure.

3.3 Procedure

On the first day, the participants took the OPT test and the Attitude Questionnaire. The results of the OPT proved the participants' homogeneity in terms of syntactic complexity, $F(1, 32) = 1.47, \rho = .23$. In order to start the treatment, the learners at this IELTS preparation institute were randomly divided into two experimental groups; namely an individual-product class and a group-product class. In each class, five students were allotted to a group to work together, totaling four groups in each class. Each session the learners received about 20 minutes of instruction on how to write which they then carried out for 40 to 60 minutes. The difference between the two classes' procedures was that the learners of the individual-product class had to collaborate (ask for help or help others). However, each student was supposed to write an individual essay at the end of the class such that in a group consisting of 5 members, 5 essays were written. Whereas the group-product class had to collaborate as a group and they were supposed to write and hand in one essay for the whole group.

The feedback which was given by the teacher included orally reminding the learners that writing complex sentences was important, giving indirect hints for subordination, coordination, making corrections, and as a last resort, giving explicit suggestions when learners had trouble connecting their sentences. They would also receive feedback for their content, mechanics, and organization from the teacher; however, these were not the focus of the study. The difference in giving feedback was that individual-product learners received feedback individually, but group-product learners received it as a group. The feedback on the class assignments was oral and it was given during the process of writing the essay.

Inside the class, the learners used Google Docs on their laptops and phones, leaving enough space between learners so that they could write collaboratively while maintaining social distancing. After the class, as homework, the learners received another topic and had to work on it outside the class in Google Docs until their next class. Using Google Docs, the learners were



able to edit their essays in real-time, in fact, all the members of the group were able to write and edit the file simultaneously and the changes they made were shown in different colors. The learners of both classes had to hand in one essay as homework on which they would receive individual feedback. The students received both written feedback on their homework assignments, and if necessary oral explanation by the teacher was an option.

The students were also able to collaborate on Telegram App at home as it is the most widely used messaging application among learners (Ebrahimpour & Siamian, 2016). On this platform, they had discussions, shared assignments, and received additional instructions from the teacher. Mainly, the teacher's role in Telegram and Google Docs was an observer to monitor the discussions when the learners were doing their assignments. However, after each class, the teacher would share instructional materials with the learners on Telegram. The instructional materials involved video clips and PowerPoint slides on how to write a one-paragraph essay, how to write a five-paragraph essay, an introduction to syntactic complexity and sentence types, specific instructions on the adverbial, noun, and adjective clauses, and additional vocabulary for writing academic essays. The benefit of using these materials was that they saved a huge amount of time and energy for both the teacher and the learners. The videos were short and very straight forward unlike a class which may sometimes contain irrelevant discussions or repeated instructions and clarifications. The learners who needed to review the instructions could watch the videos repeatedly asking their teacher any remaining problems later on. Online materials were always accessible to the learners giving them control over their pace and learning.

3.4 Ethical Considerations

The participants were informed about and consented to take part in the study. Their dignity and privacy were respected and the confidentiality of the research data was ensured.

4. Results

4.1 Oxford Placement Test

As already mentioned, The Oxford Placement Test was used to check the homogeneity of the two groups. The obtained data were analyzed by SPSS. As shown in Table 2, Levene's test of equality

of variances shows that there was not a significant difference in the mean scores of the classes $p = 0.09$, illustrating the homogeneity of the two groups on the pretest. The results of the normality table showed that at the beginning of the course, both the individual-product class, $D(20) = 0.12$, $p = 0.20$, and the group-product class $D(20) = 0.18$, $p = 0.06$ were normally distributed (**Error! Reference source not found.3**). This indicated that it was possible to run an ANOVA to check the homogeneity of the two groups. The results of the ANOVA on the pretest $F(1, 32) = 1.47$. $p = .23$ demonstrate there was no statistically significant difference between the two groups at the beginning of the study (Table 4).

4.2 Post-test on Syntactic Complexity

After running the homogeneity tests for the post-tests (MLC, $p = 0.73$; MLTU, $p = 0.004$; CTU, $p = 0.04$; GI, $p = 0.01$; SSR $p = 0.05$), it was observed that there were some outliers among the learners, so a total of 6 extreme outliers were removed. The homogeneity tests after removing the outliers showed that there still was some heterogeneity among the samples (MLC, $p = 0.9$; MLTU, $p = 0.01$; CTU, $p = 0.05$; GI, $p = 0.0$; SSR $p = 0.02$); however, the class sizes were kept equal (e.g., Glass & Stanley, 1970; Hays, 1981; Keppel, 1991; Maxwell & Delaney, 1990; Winner, 1971) and the alpha was set at a more stringent level (Keppel et al., 1992; Keppel & Wickens, 2004; Tabachnick & Fidell, 2007, 2013) that is .025 instead of .05 to counteract heterogeneity.

Table 7 : Descriptive Statistics for post-test

	Method	Mean	SD	N
MLC	Individual-product	8.1114	.69048	17
	Group-product	8.9200	.71399	17
MLTU	Individual-product	11.7647	.50757	17
	Group-product	14.1006	2.86389	17
CTU	Individual-product	1.4518	.10519	17
	Group-product	1.5724	.33335	17
GI	Individual-product	2.8053	.95463	17
	Group-product	2.2788	.44686	17
SSR	Individual-product	.2688	.19381	17
	Group-product	.2288	.13167	17
Total	Individual-product		3.71	17
	Group-product	24.40	3.04	17
		27.10		

MLC: Mean length of clauses, MLTU: mean length of T-units CTU: Clauses per T-unit

GI: grammatical intricacy, SSR: simple sentence ratio

In order to study the effect of the different treatments on the syntactic complexity of the two classes an ANCOVA was run. Tests of between subject effects (

8) identified the significant factors and showed that neither pretest nor gender had a significant effect on any of the syntactic complexity components and hence is not depicted in the

8. Gender-method interaction has a significant effect on the MLC ($p = 0.01$) with a large effect size ($\eta_p^2 = 0.2$) and total ($p = 0.01$) with a large effect size ($\eta_p^2 = 0.18$); however, it does not have a significant effect on the MLTU ($p = 0.05$) with a medium effect size ($\eta_p^2 = 0.12$), CTU ($p = 0.48$) with a small effect size ($\eta_p^2 = 0.02$), GI ($p = 0.6$) with a small effect size ($\eta_p^2 = 0.01$), and SSR ($p = 0.12$) with a medium effect size ($\eta_p^2 = 0.08$). The next important factor to investigate is the method which was significantly effective on the MLC ($p = 0.001$) with a large effect size ($\eta_p^2 = 0.31$), MLTU ($p = 0.005$) with a large effect size ($\eta_p^2 = 0.24$), GI ($p = 0.02$) with a large effect size ($\eta_p^2 = 0.16$), and total ($p = 0.01$) with a large effect size ($\eta_p^2 = 0.20$) as it can be seen, the method's effect size on all of the mentioned components is large. The other factors, CTU ($p = 0.35$) with a small effect size ($\eta_p^2 = 0.02$), and SSR ($p = 0.42$) also with a small effect size ($\eta_p^2 = 0.02$) were not significantly affected by the method.

Table 8 Tests of Between-Subjects Effects for post-test

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Method	MLC	5.391	1	5.391	13.427	.001	.316
	MLTU	29.186	1	29.186	9.242	.005	.242
	CTU	.051	1	.051	.874	.358	.029
	GI	2.940	1	2.940	5.545	.026	.161
	SSR	.017	1	.017	.659	.424	.022
	Total	37.279	1	37.279	7.433	.011	.204
Method * Gender	MLC	2.985	1	2.985	7.435	.011	.204
	MLTU	13.014	1	13.014	4.121	.052	.124
	CTU	.030	1	.030	.510	.481	.017
	GI	.147	1	.147	.277	.602	.009
	SSR	.065	1	.065	2.534	.122	.080
	Total	31.764	1	31.764	6.333	.018	.179

Subsequently, gender has no effect on the syntactic complexity of the learners. The descriptive table depicts that the group-product class did better on the mean length of clauses and the mean length of T-units. However, the individual-product class had a significantly higher value than the group-product class on grammatical intricacy.

This study was designed to probe the attitude of the learners towards the different collaborative methods, as well. The learners' attitudes were measured using the "Attitude Questionnaire". The differences between the learners' attitudes based on the methods are presented in **Error! Reference source not found.** (pretest) and Table 9 (post-test). The results in **Error! Reference source not found.** suggest that at the beginning, in the individual-product class 35% of learners showed positivity toward collaborative writing, 50% of learners preferred to write alone, and 40% percent of learners wanted to have a chance to try collaborative writing. On the other hand, in the group-product class at the beginning, 30% of learners were positive about collaborative writing, 55% preferred writing alone, and 40% were willing to try collaborative writing.

The attitudes of learners were tested at the end of the course again. The results in Table 9 show that at the end of the course, in individual-product class 75% of learners had positive attitudes towards collaborative writing, 10% preferred writing alone, and 75% wanted to have more chances for collaborative writing.

Table 9 Frequency Table regarding learners' attitudes in post-test

		Method			
		individual		group	
		Count	Column N %	Count	Column N %
Willingness toward Collaborative Writing Post-test	very unfavorable	0	0.0%	1	5.0%
	unfavorable	3	15.0%	1	5.0%
	neutral	2	10.0%	4	20.0%
	favorable	9	45.0%	6	30.0%
	very favorable	6	30.0%	8	40.0%
Willingness toward Individual Writing Post-test	very unfavorable	5	25.0%	3	15.0%
	unfavorable	5	25.0%	8	40.0%
	neutral	8	40.0%	5	25.0%
	favorable	2	10.0%	1	5.0%
	very favorable	0	0.0%	3	15.0%
Willingness toward Having a Collaborative Writing Chance Post-test	very unfavorable	0	0.0%	2	10.0%
	unfavorable	0	0.0%	1	5.0%
	neutral	4	20.0%	7	35.0%
	favorable	9	45.0%	7	35.0%
	very favorable	7	35.0%	3	15.0%

On the other hand, at the end of the course, in the group-product class 70% of learners were positive toward collaborative writing, 20% preferred to write alone, and 50% of learners wanted to have more chances for collaborative writing; therefore, at the end of the study, the learners' tendency towards writing in a group had increased and their inclination towards writing alone had decreased.

The Kruskal-Wallis H test was run to ensure the statistical significance of the difference between the learners' attitudes on the post-test. The results, $X^2(1, n = 40) = 0.55$, $p = 0.45$, indicate methods did not make any significant difference in learners' attitudes. The descriptive tables show an improvement in the attitudes of both groups (Table 10).



Table 10 Independent-Samples Kruskal-Wallis Test Summary on the post-test

Total N	40
Test Statistic	.555 ^{a,b}
Degree Of Freedom	1
Asymptotic Sig. (2-sided test)	.456

Even though the difference between the two groups is not significant both groups have improved due to the treatment. The attitude score on the pretest of the individual-product class was 3.3 which increased to 5.7. A Wilcoxon Signed Rank Test revealed this difference to be statistically significant, $z = 2.93$, $\rho = .003$, with a large effect size ($r = .65$). The attitude scores of the group-product class also increased from 2.3 to 4.7; reflecting a significant difference shown by another Wilcoxon Signed Rank Test, $z = 3.03$, $\rho = .002$, with a large effect size ($r = .67$).

5. Discussion

The present study examined the effect of gender and two types of in-class collaboration on the syntactic complexity of EFL learner's writing. More specifically, it aimed to investigate whether participants in the individual-product class improved their syntactic complexity more than the individuals in the group-product class. It is worth mentioning that collaborative writing affects learners' syntactic complexity more than traditional writing methods ([Gallego, 2019](#); [Menke & Strawbridge, 2019](#)), however, the influence of different types of collaboration have not been thoroughly researched. The results of this analysis indicate that the group-product class did better on the mean length of clauses, mean length of T-units, and the total and the individual-product class had a significantly better performance than the group-product class on grammatical intricacy. Halliday (1994) states that lower grammatical intricacy is an indication of improvement; therefore, even though the individual-group has scored higher on this factor this is an indicator of lower syntactic complexity.

This study also tried to compare the attitudes of the two groups towards collaboration. The statistical results indicated that different collaboration methods did not make any significant difference in learners' attitudes, nevertheless, both groups had significantly changed from the start to the conclusion of the treatment. Moreover, it was also found that syntactic complexity proves to have the same developmental process regardless of gender.

The findings demonstrate that students who wrote and handed in one essay as a group did better on the mean length of clauses and the mean length of T-units, however, those students who worked in a group but handed in individual essays did better on grammatical intricacy; therefore, individual-group participants tend to use more coordinators and fewer subordinators and embedded clauses but when students collaborate on the final product, they are able to increase the varieties of syntactic structures, clauses and the length of T-units resulting in higher syntactic complexity.

The studies of Menke & Strawbridge (2019) and Byrnes (2014) indicate that the significant difference in the mean length of clauses and the mean length of T-units between the two groups was probably because group-product learners learn how to use more modifiers and phrases from their peers as a result of the interaction taking place to prepare and submit a joint essay. However, in the individual-product class learners only learn syntactic complexity development skills theoretically from the teacher and ask their peers about it but they do not work on a joint essay which may be the reason why they are not able to perform as well as the group-product class on the mean length of the clauses and the mean length of T-units. Individual-product students are able to achieve higher grammatical intricacy which is an indicator of lower levels of syntactic complexity ([Menke & Strawbridge, 2019](#); [Byrnes et al., 2014](#); [Halliday 1994](#)) revealing a group product could be more effective in improving the syntactic complexity of writers of English as a foreign language.

Another possible reason for the differences in inter-clausal relationships between two classes can be the sense of ownership which may affect the learners' willingness to collaborate ([Goodwin-Jones, 2018](#)). As lower-level learners improve they tend to use subordinators instead of coordinators ([Byrnes et al., 2014](#)). Coordinators seem to be easier to punctuate and use since subordinators have the possibility of being confused by conjunctive adverbs; hence, punctuating them can create problems for less proficient learners. It is speculated that the mutual sense of ownership reduces the difficulties of subordination by promoting collective efforts and collective intelligence. This can be found in previous studies which state higher grammatical intricacy is more

observable in lower levels, but clauses per T-unit increase in advanced levels (Menke & Strawbridge, 2019; Byrnes et al., 2014; Halliday 1994).

Additionally, in this study, even though the attitudes of the groups are not statistically different both groups significantly improved as a result of collaboration. This transformation of attitudes has also been found by Chen & Yu (2019). As learners' beliefs and learning experiences can affect attitudes and behaviors (Barcelos, 2003; Chen & Yu, 2019) in this study the positive experience of collaboration leads to development in writing and an improved attitude. Both groups were negotiating for meaning through collaboration resulting in improved outcomes; therefore, the findings of this study illustrate that the group-product classes are more successful in advancing learners' syntactic complexity, but then again they almost have the same positive effect on learners' attitudes as the individual-product classes.

6. Conclusions

The results of this study suggest that using a group-product method can enhance the syntactic complexity of learners. Moreover, in the case of learners' attitudes, it is true that during the course the attitudes of learners can change (Chen & Yu, 2019); however, based on the present results, the type of collaboration; individual-product vs. group-product, does not make a significant difference in the way collaboration is viewed. In addition, both group-product and individual-product-based classes can be beneficial, but group-product classes are generally better in increasing syntactic complexity. It should be kept in mind that some learners always feel more comfortable working alone (Chen & Yu, 2019) as there were some learners who had negative views both at the beginning and the end of the course. Considering the general and personal styles of learners even though this study finds collaboration to be effective, learners who show no interest in collaborating are best left to work individually. Consequently, it seems necessary that L2 researchers and practitioners need to conduct more studies on learning styles and individual differences in collaborative classes. In this study, it was observed that learners freely ask each other the meanings of new words in both classes yet they refrain from asking about grammar and organization especially in individual-product classes. The reason may be language

ego; asking about new words or ideas is not ideologically belittling, but asking about grammar and organization implies that the learners are not competent enough. These factors may give rise to inquiries concerning ideological factors affecting collaboration.

References

- Ansarifar, A., Shahriari, H., & Pishghadam, R. (2018). Phrasal complexity in academic writing: A comparison of abstracts written by graduate students and expert writers in applied linguistics. *Journal of English for Academic Purposes*, 31, 58–71.
- Bailey, E. P., & Powell, P. A. (1989). *The practical writer with readings* (7th ed). Wadsworth: Cengage Learning
- Barcelos, A.M.F., 2003. Researching beliefs about SLA: a critical review. In: Kalaja, P., Barcelos, A.M.F. (Eds.), *Beliefs about SLA: New Research Approaches*. Kluwer Academic Publishers, Dordrecht, pp. 7e33.
- Bardovi-Harlig, K. (1992). A second look at T-unit analysis: Reconsidering the sentence. *TESOL Quarterly*, 26, 390–395.
- Biber, D. (1995). *Dimensions of register variation: A cross-linguistic comparison*. Cambridge: Cambridge University Press.
- Biber, D. (1998). *Variation across speech and writing*. Cambridge: Cambridge University Press.
- Biber, D., Johansson, s., Leech, G., Conrad, S., & Finegan, E. (1999). *Longman grammar of spoken and written English*. Edinburgh: Pearson Education Limited.
- Biber, D. (2006). *University language: A corpus-based study of spoken and written registers*. Amsterdam: John Benjamins.
- Biber, D., & Gray, B. (2010). Challenging stereotypes about academic writing: Complexity, elaboration, explicitness. *Journal of English for Academic Purposes*, 9, 2–20.
- Biber, D., & Gray, B. (2011). Grammatical change in the noun phrase: The influence of written language use. *English Language and Linguistics*, 15(2), 223–250.
- Biber, D., Gray, B., & Poonpon, K. (2011). Should we use characteristics of conversation to measure grammatical complexity in L2 writing development? *TESOL Quarterly*, 45(1), 5–35.
- Biber, D., Gray, B., & Staples, S. (2016). Predicting patterns of grammatical complexity across language exam types and proficiency levels. *Applied Linguistics*, 37, 639–668.



- Brook-Hart G. & Jakeman, V. (2011). Cambridge English IELTS 8 with Answers. Cambridge: Cambridge University Press
- Brown, H. D. (2001). *Teaching by principles: An interactive approach to language pedagogy*. White Plains, NY: Longman.
- Bulté, B., & Housen, A. (2014). Conceptualizing and measuring short-term changes in L2 writing complexity. *Journal of Second Language Writing*, 26, 42–65.
- Byrnes, H., Maxim, H., & Norris, J. M. (2010). Realizing advanced foreign language writing development in collegiate education: Curricular design, pedagogy, assessment [Monograph]. *Modern Language Journal*, 94(Suppl. s1).
- Byrnes, H. (2014). Linking task and writing for language development: Evidence from a genre-based curricular approach. In H.
- Chen, W., & Yu, S. (2019). A longitudinal case study of changes in students' attitudes, participation, and learning in collaborative writing. *System*, 82, 83–96.
<https://doi.org/10.1016/j.system.2019.03.005>.
- Colombi, C. (2002). Academic language development in Latino students' writing in Spanish. In M. Schleppergrell, & M. C. Colombi (Eds.). *Developing advanced literacy in first and second languages: Meaning with power* (pp. 67–86). Mahwah, NJ: Lawrence Erlbaum Associates.
- De Clercq, B., & Housen, A. (2017). A cross-linguistic perspective on syntactic complexity in L2 development: Syntactic elaboration and diversity. *Modern Language Journal*, 101(2), 315–334.
- Ebrahimpour, A. & Siamian, H. (2016). The Effect of Social Networks on the Scientific Research Relations, Prospectiveness, Creativity and satisfaction of Scientific Position. *International Journal of Medical Research & Health Sciences*.
- Fernández Dobao, A. (2012). Collaborative writing tasks in the L2 classroom: Comparing group, pair, and individual work. *Journal of Second Language Writing*, 21, 40–58.
<https://doi.org/10.1016/j.jslw.2011.12.002>.
- Gaies, S. (1980). T-unit analysis in second-language research: Applications, problems, and limitations. *TESOL Quarterly*, 14(1), 53–60.
- Gallego, M. (2019). L2 Spanish morphosyntactic development through collaborative writing: An analysis of mood production, text length and syntactic complexity.
<https://doi.org/10.1177/1362168819885406>.
- Gentina, E, & R. Chen. 2019. Digital natives' coping with loneliness: Facebook or face-to-face? *Information and Management Journal*, 56(6)
- Glass, G. V., & Stanley, J. C. (1970). *Statistical Methods in Education and Psychology*. Englewood Cliffs: Prentice-Hall.
- Godwin-Jones, R. (2018). Second language writing online: An update. *Language Learning and Technology*, 22(1), 1–15.
- Halliday, M. A. K. (1994). *An introduction to functional grammar*. London: Edward Arnold. London: The Falmer Press.
- Hays, W. L. (1981). *Statistics* (3rd Edition). New York: Holt, Rinehart, Winston, Inc.
- Krantz, D. H., Lute, R. D., Suppes, P.
- Homburg, T. J. (1984). Holistic evaluation of ESL compositions: Can it be validated objectively? *TESOL Quarterly*, 18, 87–107.
- Housen, A., & Kuiken, F. (2009). Complexity, accuracy and fluency in second language acquisition. *Applied Linguistics*, 30, 461–473.
- Hunt, K. W. (1965). Grammatical structures written at three grade levels (research report no. 3) Champaign, IL: National Council of Teachers of English.
- Ishikawa, S. (1995). Objective measurement of low-proficiency ESL narrative writing. *Journal of Second Language Writing*, 4, 51–70.
- Jiang, J., Bi, P., & Liu, H. (2019). Writing Syntactic complexity development in the writings of EFL learners: Insights from a dependency syntactically-annotated corpus. *Journal of Second Language Writing*, 46(August), 100666.
<https://doi.org/10.1016/j.jslw.2019.100666>.
- Keppel, G. (1991). *Design and analysis: A researcher's handbook* (3rd ed.). Englewood Cliffs: Prentice-Hall.
- Keppel, G., Saufley, W. H., & Tokunaga, H. (1992). *Introduction to design and analysis: A student's handbook* (2nd ed.). New York: W. H. Freeman.
- Keppel, G., & Wickens, T. D. (2004). *Design and analysis: A researcher's handbook* (4th ed.). Englewood Cliffs: Prentice Hall.
- Kyle, K., & Crossley, S. A. (2018). Measuring syntactic complexity in L2 writing using fine-grained clausal and phrasal indices. *Modern Language Journal*, 102, 333–349.
- Lu, X. (2011). A corpus-based evaluation of syntactic complexity measures as indices of college-level ESL writers' language development. *TESOL Quarterly*, 45(1), 36–62.

- Lu, X. (2017). Automated measurement of syntactic complexity in corpus-based L2 writing research and implications for writing assessment. *Language Testing*, 34(4), 493–511.
- Maxwell, S. E., & Delaney, H. D. (1990). *Designing experiments and analyzing data: A model comparison perspective*. Belmont: Wadsworth.
- McDonough, K., De Vleeschauwer, J., & Crawford, W. (2018). Comparing the quality of collaborative writing, collaborative prewriting, and individual texts in a Thai EFL context. *System*, 74, 109–120. <https://doi.org/10.1016/j.system.2018.02.010>.
- Menke, M. R., & Strawbridge, T. (2019). The writing of Spanish majors: A longitudinal analysis of syntactic complexity. *Journal of Second Language Writing*, 46(August), 100665. <https://doi.org/10.1016/j.jslw.2019.100665>.
- Neff, J., Dafouz, E., Diez, M., Prieto, R., & Chaudron, C. (2004). Contrastive discourse analysis: Argumentative text in English and Spanish. In C. L. Moder & A. Martinovic-Zic (Eds.), *Discourse across languages and cultures* (pp. 267–283). Amsterdam: Benjamin
- Norris, J. M., & Ortega, L. (2009). Towards an organic approach to investigating CAF in instructed SLA: The case of complexity. *Applied Linguistics*, 30(4), 555–578.
- Orellana, A. (2006). Class size and interaction in online courses. *Quarterly Review of Distance Education*, 7(3), 229–48.
- Ortega, L. (2003). Syntactic complexity measures and their relationship to L2 proficiency: A research synthesis of college-level L2 writing. *Applied Linguistics*, 24(4), 492–518.
- Ortega, L. (2015). Syntactic complexity in L2 writing: Progress and expansion. *Journal of Second Language Writing*, 29, 82–94.
- Parkinson, J., & Musgrave, J. (2014). Development of noun phrase complexity in the writing of English for Academic Purposes students. *Journal of English for Academic Purposes*, 14, 48–59.
- Sagnier, C. (2016). *Multiliteracies and multimodal discourses in the foreign language classroom*. In Y. Kumagai, A. López-Sánchez, & S. Wu (Eds.), *Multiliteracies in world language education* (pp. 81–106). New York: Taylor & Francis.
- Sharma, A. (1980). Syntactic maturity: Assessing writing proficiency in a second language. In R. Silverstein (ed.), *Occasional papers in linguistics*, No. 6 (pp. 318–325). Carbondale, IL: Southern Illinois University.
- Storch, N. (2005). Collaborative writing: Product, process, and students' reflections. *Journal of Second Language Writing*, 14(3), 153–173. <https://doi.org/10.1016/j.jslw.2005.05.002>.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental design using ANOVA*. Belmont: Thomson Brooks/Cole.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Boston: Pearson Education, Inc.
- Tomei, L. A. (2006). The Impact of Online Teaching on Faculty Load: Computing the Ideal Class Size for Online Courses. *Journal of Technology and Teacher Education*, 14(3), 531–41.
- Tomei, L. A., & Nelson, D. (2019). The Impact of Online Teaching on Faculty Load – Revisited: Computing the Ideal Class Size for Traditional, Online, And Hybrid Courses. *International Journal of Online Pedagogy and Course Design (IJOPCD)*, 9(3), 1–12. <http://doi.org/10.4018/IJOPCD.2019070101>.
- Verspoor, M., Schmid, M. S., & Xu, X. (2012). A dynamic usage based perspective on L2 writing. *Journal of Second Language Writing*, 21, 239–263.
- Wigglesworth, G., & Storch, N. (2009). Pair versus individual writing: Effects on fluency, complexity and accuracy. *Language Testing*, 26, 445–466. <https://doi.org/10.1177/0265532209104670>.
- Winner, B. J. (1971). *Statistical principles in experimental designs* (2nd ed.). New York: McGraw-Hill.
- Wolfe-Quintero, K., Inagaki, S., & Kim, H. (1998). *Second language development in writing: Measures of fluency, accuracy, and complexity*. Honolulu: University of Hawai'i Press.