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"The Effects of Carrying out Collaborative Writing on the Individual Writing Proficiency of English Second Language Learners in an English for Academic Purposes Program"

Abstract

This quasi-experimental classroom-based study (n=128) looks at what students in an English for Academic Purposes Program (EAP) learn from the process of writing collaboratively and how this affects the individual writing that they subsequently produce. This is compared to how individual writing is affected by carrying out independent writing. Previous research carried out by Storch (2005), Storch and Wigglesworth (2007), Wigglesworth and Storch (2009), Dobao (2012), McDonough, De Vleeschauwer and Crawford (2018) and Villarreal and Gil-Sarratea (2019) found that writing produced collaboratively (by pairs or groups of writers) was more accurate than writing produced independently. This thesis suggests that individual students can learn from the process of writing collaboratively and that their own subsequent individual writing could become more accurate or improve as a result.

Analysis of individual pre and post-test writing completed before and after two groups of students had carried out a series of writing tasks either collaboratively (collaborative writing group, n=64) or independently (independent writing group, n=64) over a period of 8 weeks revealed that accuracy increased to a significantly greater degree in the post-test writing of students from the collaborative group than in the same writing of students from the independent writing group. On the other hand, there were similar statistically significant increases in fluency and lexical complexity in the post-test writing of both groups and in the coherence and cohesion of post-test writing although syntactic complexity did not increase significantly in either group. In this study, it seems that carrying out collaborative writing has had a notable impact on the accuracy of the individual writing that learners who engaged in this writing process subsequently produced. Other facets of individual writing developed in a similar way after completing collaborative writing and the independent writing that is commonly carried out in English for Academic Purposes programs.

Analysis of collaborative dialogue also revealed that students engaged in language related episodes concerning the use of language in the coauthored text that they produced. This involved peer discussion about how language was used, peer-to-peer corrective feedback and sharing knowledge about language use. The results also indicated that other interactive processes besides language related episodes, such as noticing, could also facilitate possible learning

This study contributes to the field of Second Language Writing and English for Academic Purposes **(EAP)** because it highlights the learning potential of this interactive writing process and suggests that collaborative writing is a viable learning to write activity for the field of EAP.

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Table of Contents

1. Introduction 1

1.1 Statement of Issue 1

1.2. Definition and scope of collaborative writing analysed in this study 3

2. The research context - English for Academic Purposes 4

3. Second Language writing 6

3.1 Two different perspectives about learning and second language writing 6

3.2 Writing to learn 7

3.2.1 Writing to learn language 7

3.3. Learning to write 12

3.3.1 Three different views of learning to write 12

3.3.2 Learning to write which focuses on text 12

3.4 Two types of knowledge involved in learning to write 14

3.4.1 Linguistic knowledge 14

3.4.2 Knowledge of written discourse 16

3.5 Different culturally influenced rhetorical patterns or strategies 17

3.6 Deductive vs Inductive rhetorical patterns and reader expectations 17

3.6.1 Deductive rhetorical pattern 17

3.6.2 Inductive rhetorical pattern 18

3.7 Using L1 rhetorical patterns in L2 19

3.8 Learning about different rhetorical patterns or writing strategies in L2 19

3.9 Cohesion in writing 20

3.9.1 Cohesive devices 21

3.9.2 The link between cohesion and second language writing. 22

3.10 Coherence 22

3.10.1 Learning to write coherently 23

3.11 The link between learning to write and writing to learn in EAP 24

4. Learning and interaction 26

4.1 What is learning? 26

4.2 Learning from a sociocognitive perspective 27

4.3 Why learning is viewed from a sociocognitive perspective in this study 28

4.4 The definition of learning used in this study 28

4.4.1 Justification for the definition of learning used in this study 29

4.5 What types of knowledge do EAP second language writers need? 30

4.5.1 Linguistic knowledge 30

4.5.2 Knowledge of written discourse 31

4.6 The interaction approach 32

4.7 Interactional processes that can facilitate L2 writing related learning 33

4.7.1 Language Input 33

4.7.2 Feedback 34

4.7.3 Language Related Episodes 35

4.7.4 Output and language modification 38

4.8 Summary 38

5. Collaborative writing 39
5.1. The development of collaborative writing 39
5.2 Collaborative writing in L2 40
5.3 Factors that may impact the learning potential of collaborative writing in L2 41
5.4 How collaborative writing can facilitate learning 45
5.5 Interactive processes in collaborative writing that may facilitate learning 46
5.5.1 Producing co-authored text engages learners in different roles and activities 46
5.5.2 The importance of external deliberation 47
5.5.3 Provision of new knowledge about language use and about written discourse 48
5.5.4 Feedback 49
5.5.5 Opportunities for language modification 50
5.6 Research into collaborative writing and learning in L2 51
5.6.1 Studies comparing writing completed independently or collaboratively 52
5.6.2 Studies comparing writing before and after collaboration 54
5.6.3 Studies that identify language related episodes in collaborative writing and collaborative tasks 56
5.6.4 Studies comparing collaborative and individual performance of other writing-related tasks 57
5.7 Summary 59
6. Methods 60
6.1 The research context 60
6.2 An overview of the study carried out 60
6.3 Research questions 61
6.4 Research Design 62
6.5 Balancing internal and ecological validity 62
6.6 Participants 63
6.7 Classroom setting and instruction 63
6.8 Grouping 66
6.8.1 Number of participants and group size 66
6.9 Collection of data 68
6.10 Instruments 68
6.10.1 Pre and post-test writing activities 68
6.10.2 Recorded collaborative dialogue 69
6.11 Analysis 70
6.12 Analysis of individual pre and post-test writing samples 70
6.12.1 Analysis of pre and post-test writing assessment data 70
6.13 Manual assessment of hand-written scripts 71
6.13.1 Coding 72
6.13.2 Assessment of the first and second assessor (writing) 73
6.13.3 Preparing assessment guides and descriptors 73
6.13.4 Coder selection and training 73
6.13.5 Checking intra and inter-rater reliability 74
6.13.6 Resolving differences between both assessments 77
6.14 Computerized assessment of transcribed scripts 78
6.14.1 Preparation of transcribed texts for computerized analysis 78
6.14.2 Assessing data 78
6.15 Combined manual and computerized assessment 79
6.15.1 Preparation of transcribed texts for manual/computerized analysis 79

6.15.2 Assessing data 79

6.16 Measures of writing 80
6.16.1 Linguistic and rhetorical features of writing 80
6.16.2 Linguistic measures of pre and post-test writing samples 80
6.16.3 Measuring complexity, accuracy, and fluency in pre and post-test writing 81
6.13.4 Analysis of the rhetorical features of writing 85

6.17 Identification and analysis of LREs in collaborative writing dialogue 88

6.18 Manual identification of LREs in collaborative writing dialogue 88
6.18.1 Coding 88
6.18.2 Preparation of transcripts of collaborative writing dialogue 88
6.18.3 Assessment of the first and second assessor (LREs) 89
6.18.4 Preparing assessment guides and descriptors 89
6.18.5 Coder selection and training 89
6.18.6 Training procedure 90
6.18.7 Checking intra and inter-rater reliability and resolving differences between assessment 91
6.18.8 Identifying spelling or punctuation related M-LREs and organization or cohesion related D-LREs 92

6.19 Measures of language related episodes 93

7. Results 94

7.1 Analysis of pre and post-test writing scripts 94
7.1.1 Presentation of results 94
7.1.2 Descriptive statistics and the results of tests of statistical significance 94
7.1.3 Checking the assumptions of MANOVA and ANOVA tests 95

7.2 Analysis of the linguistic development of pre and post-test writing 99
7.2.1 Accuracy 99
Summary – changes in accuracy 104
7.2.2 Fluency 105
Summary – changes in fluency 108
7.2.3 Complexity 109
Summary – changes in lexical complexity 115
Summary – changes in syntactic complexity 121

7.3 Analysis of the rhetorical development of pre and post-test writing 122
7.3.1 Coherence 122
Summary – changes in measures of coherence 127
7.3.2 Cohesion 128
Summary – changes in measures of cohesion 131

7.4 Analysis of language related episodes (LREs) in collaborative writing dialogue 132
7.4.1 Mean number and percentage of LREs in collaborative writing dialogue 132
7.4.2 Frequency of LREs in collaborative writing dialogue 133

8. Discussion 138

8.1 Research questions 139

8.2 Research question 1 140
8.2.1 Summary of results 140
8.2.2 Summary of the answer to research question 1 141

8.3 Links to previous research 142

8.4 Collaborative writing as a writing to learn language activity 145
8.4.1 The opportunities to learn about language use in writing that collaborative writing provides 146
8.4.2 Summary 152

8.5 Research question 2 153
8.5.1 Summary of results 153
8.5.2 Summary of the answer to research question 2 154

8.5.3 Links to previous research....155
8.5.4 Do students learn about coherence and cohesion through collaborative writing? 156
8.6 Research question 3....162
8.6.1 Summary of results....162
8.6.2 Analysis of LREs in collaborative writing in other studies....163
8.6.3 Summary of the answer to research question 3....163
8.6.4 Language related episodes associated with learning language....164
8.6.5 Language related episodes associated with written discourse....165
9. Conclusion and pedagogical implications....166
9.1 Conclusion....166
9.2 Pedagogical implications....167
9.3 Limitations....168
9.4 Further investigation....175
10. References....177
11. Appendices....191

1. Introduction

1.1 Statement of Issue

The aim of this study is to look at how the individual writing of students in an English for Academic Purposes Program **(EAP)** is affected by carrying out collaborative writing and how this compares to changes in their individual writing after completing independent writing over the same period of time.

Writing can not only be viewed as the product or the result of language acquisition, but also as a process or a vehicle that facilitates learning in L2 (Manchón 2011, p.61; Williams 2012, p.321). Writing provides students with very different opportunities to learn about language use than those provided by oral communication because the slower pace at which written discourse is produced allows learners to think about and reevaluate the language that they use (Hirvela, Hyland & Manchón 2016, p.57; Schoonen, Snellings, Stevenson, and Van Gelderen 2009, p.81-82). In addition to this, the permanence of writing allows learners to go back to their work and to analyze and reconsider their use of language (Adams 2003, p.349; Hirvela *et al* 2016, p.57).

One problem with the independent writing commonly completed in most second language (L2) classrooms is that the learner does not have the chance to receive the continuous feedback that an interlocutor can provide during oral communication, such as indications that his or her language attempt has not been fully understood (Storch, 2013, p. 1). However, this is not true of collaborative writing. Storch (2019) stresses that collaborative writing is an activity that can provide learners with ample opportunities to give and receive rich and timely feedback and potentially provide them with an opportunity to learn (p.156). While writing collaboratively, each learner can receive peer feedback about his or her language use when making proposals for ideas to be included in the coauthored text. At the same time, a student can discuss language use with his or her peer (see Storch 2005; Dobao 2012; Storch and Wigglesworth 2007; Wigglesworth and Storch 2009), or notice how new words and grammatical structures are used by his or her partner. The interactive processes that occur during collaborative writing may therefore provide different opportunities to learn than those provided by independent writing. However, the use of collaborative writing is still relatively uncommon in most L2 writing classrooms because the learning potential of this writing procedure has yet to be fully clarified and assessed (Dobao 2012, p.42; Storch 2013, p.169).

To date, studies relating to the use of collaborative writing in L2 have focused on how writing produced collaboratively differs to writing that is produced individually (e.g. Storch 2005; Storch and Wigglesworth 2007; Wigglesworth and Storch 2009; Dobao 2012; McDonough, De Vleeschauwer and Crawford 2018; Villarreal and Gil-Sarratea 2019) rather than look at what individuals learn from writing collaboratively and at how their own writing changes as a result. Collectively, the previously mentioned studies have highlighted differences between writing that is produced collaboratively and writing that is produced independently. For example, writing produced collaboratively by pairs and groups of students was found to be more accurate than text produced by one writer, but these studies did not demonstrate that the individual participants had actually learned to produce more accurate writing themselves. Kang and Lee (2019) stress that it is still questionable whether learners who participate in collaborative work can perform at the same level when writing independently (p. 62) or whether their own individual writing will also improve as a result.

The research that I have carried out will address this issue. It will look at what individual students learn from completing collaborative writing and at how their own subsequent individual writing changes as a result and compare this to changes in individual writing after completing independent writing over the same period of time. Polio (2011) stresses that it is important to look at a range of measures that can characterize writing (p.152). Accordingly, it is also important to look at a number of different measures to fully identify changes in the written discourse that learners produce. With this in mind, I will analyze the effect of collaborative writing on the linguistic features of text relating to complexity, accuracy, and fluency as well as its effect on rhetorical features relating to the coherence and cohesion of the writing produced. In this study, the following research questions will be addressed:

1. How do accuracy, fluency and complexity change in individual writing after carrying out collaborative writing in a 10-week English for Academic Purposes course and how does this differ to how they change in the individual writing of students who completed independent writing over the same period of time?
2. Does carrying out collaborative writing affect the coherence and cohesion of individual writing that is subsequently produced and how does this differ to differences noted in the coherence and cohesion of individual writing produced after writing independently?
3. To what extent do learners engage in language related episodes associated with learning about language and written discourse while completing collaborative writing?

1.2. Definition and scope of collaborative writing analysed in this study

In order to assess the effects of carrying out collaborative writing in the context of this study, it is necessary to define what collaborative writing is and what it is not. Collaborative writing is a process where participants work together and interact throughout the writing process, contributing to the planning, generation of ideas, deliberations about the text structure, and editing and revision (Storch 2013, p.2). This differs from cooperative writing where writing is divided into tasks among the group and not necessarily completed together (Philp, Adams & Iwashita 2014, p.2) which is not analysed in this study.

Collaborative writing may also be divided into collaborative writing that is completed on-line and collaborative writing that is completed by students in a physical, classroom setting (Storch 2019, p.143). This research explores the use of collaborative writing in an English for Academic Purposes program that is carried out in a physical, classroom setting in which the physical interaction between peers may influence how students learn. Storch (2019) suggests that there are certain differences between the interaction that occurs face-to-face and through computer-mediated communication and opportunities for learning that these two modes provide (p.154-155); a point also made by Rouhshad, Wigglesworth & Storch (2016, p.526). As a consequence, this research will only focus on collaborative writing that is carried out face-to-face or in a physical learning environment.

To limit the scope of this study, it is also necessary to specify what changes in individual writing will be assessed when gauging the effects of carrying out collaborative writing on the individual writing proficiency of learners in an EAP program because there are a number of different facets of writing that students could potentially learn about. General EAP programs are designed to help L2 students learn to produce the writing that they will have to complete in a university setting (Hyland and Shaw, 2016, p.2-4) and at the same time help them to address the language learning issues that they still face (Polio 2019, p.1; Bhowmik, Hilman and Roy 2019, p. 2). This study will focus on how completing collaborative writing may possibly help students to learn about these two different areas. It will look at how writing collaboratively may help students to learn how language is used in writing and how this writing process can allow students to learn to produce coherent and cohesive text. To assess how collaborative writing affects the use of language and the cohesion and coherence of individual writing, I will also compare this to changes noted in individual writing after students have completed writing independently under the same conditions and over the same period of time.

2. The research context - English for Academic Purposes

This study looks at what individual students can learn from completing collaborative writing in an English for Academic Purposes Program **(EAP)** and how this differs from what they learn from completing independent writing. To be able to be used in EAP programs, it is necessary to establish what individual students learn from completing collaborative writing, or more specifically at how their own subsequent individual writing will improve as a result of this process. Bhowmik, Hilman and Roy (2019) stress that collaborative writing is currently under-used in EAP programs (p.2). However, if carrying out collaborative writing leads to more pronounced improvement in individual writing than writing independently, then this may help to promote the use of this type of writing in EAP programs.

Potentially, collaborative writing could promote individual learning in a range of L2 writing contexts and could be used in English as a Foreign Language–EFL (Gries and Deshors 2015, p.130), English as an Additional Language-EAL (Arnot, Schneider, Evans, Liu, Welply & Davies-Tutt 2014, p.12), English for Specific Purposes-ESP (Paltridge & Starfield 2013, p.23) and Content and Language Integrated Learning- CLIL (Hirvela 2011, p.39). However, each of these different contexts would logically influence what type of learning we could expect to see.

English for Academic Purposes

In the simplest of terms, English for Academic Purposes (EAP) refers to the teaching of English with the specific aim of helping learners to study in that language (Flowerdew & Peacock. 2001, p.8). As a grounded, needs-based teaching philosophy (Hyland and Wong 2019, p.2), it also prepares students to complete writing and other associated activities required in each particular educational context. Hyland (2013) stresses that in universities writing is the most important skill that L2 students have to master (p.55), thus EAP has become synonymous with learning about writing and about the language needed to complete it.

Situating English for Academic Purposes programs

Bitchener, Storch and Wette (2017) point out that increasingly students are studying in universities where their mother-tongue is not the language of instruction (or communication) and where there may also be differences in how writing is completed (p.1). This has given rise to English for Academic Purposes programs that are designed to prepare L2 students for the different activities (such as writing) that they will have to complete in a university setting

(Hyland and Shaw, 2016, p.2-4). Many of the pre-sessional or common core first year courses have been designed to help students gain fluency in the conventions of relatively 'standardized' versions of academic writing in English (Hyland 2016, p.20-23; Hyland 2018 p.383). The reasoning behind this one-size-fits-all approach is that there are types of writing (such as expository writing) that are equally applicable to a wide range of subject areas. The now prevalent wide-angle EAP programs (Hyland 2016, p.20) focus on preparing students to complete the type of writing needed for a range of courses and not on writing or genres that are specific to one particular domain. Similarly, these programs do not focus on subject-specific, content language (such as ESP, or CLIL programs), but rather on the academic English needed to produce the writing that students will complete.

To assess the effects of carrying out collaborative writing on the individual writing proficiency of English second language learners in an English for Academic Purposes Program, I will focus on how carrying out collaborative writing allows students to learn about language use and how this differs to what they learn from completing individual writing. I will also look at how writing collaboratively allows students to learn about written discourse and compare this to what they learn from writing individually.

To address this, I will look at three different areas of research.

In chapter 3, I will review studies related to **second language writing**. This will include a review of two different approaches to L2 writing and learning; defined by Manchón (2011) as **writing to learn** and **learning to write** (p.3). I will also look at what L2 writers need to learn to be able to write and also how learning may be facilitated by writing.

In chapter 4, I will review studies related to **interaction and learning** and look at how the interactive processes that take place during collaborative writing may provide students with different opportunities to learn than independent writing.

In chapter 5, I will look at the studies carried out into the use of **collaborative writing** in L2 to date and examine the implications of carrying out this writing activity.

3. Second Language writing

Cumming (2001) stresses that second language writing is a multifaceted phenomenon (p.9). Second language writing can be seen as both a product (or the result of language acquisition) as well as being a process or vehicle that facilitates learning (Manchón 2011, p.61; Williams 2012, p.321). On one hand, L2 students learn to write, that is to compose or to create texts that may be different to their own language. On the other, writing is a process that can help students to learn. The pace and permanence of writing may facilitate learning and the processes that occur during collaborative writing may provide another very different opportunity for students to learn. In this section, I will analyze the **writing to learn** and **learning to write** aspects of L2 writing outlined by Manchón (2011, p.3) in relation to the collaborative and independent writing analyzed in this study.

3.1 Two different perspectives about learning and second language writing

Two of the major perspectives about L2 writing mentioned extensively in the field of L2 were outlined by Manchón (2011); these are referred to as **writing to learn** and **learning to write** (p.3). Writing to learn language (WLL) and learning to write (LW), reflect two very different ways of looking at writing. Writing to learn language views writing as a vehicle or tool to learn language (Manchón 2011, p.61) whereas through the lens of learning to write (LW) writing is the product of learning, namely what is to be learned (Hyland, 2011, p17-18). These two very different perspectives have been informed by different theoretical frameworks, have resulted in different pedagogical procedures, and have developed almost independently from each other however Manchón (2011) recognizes that in some educational contexts learning to write and writing to learn are inseparable from one another (p.3-5).

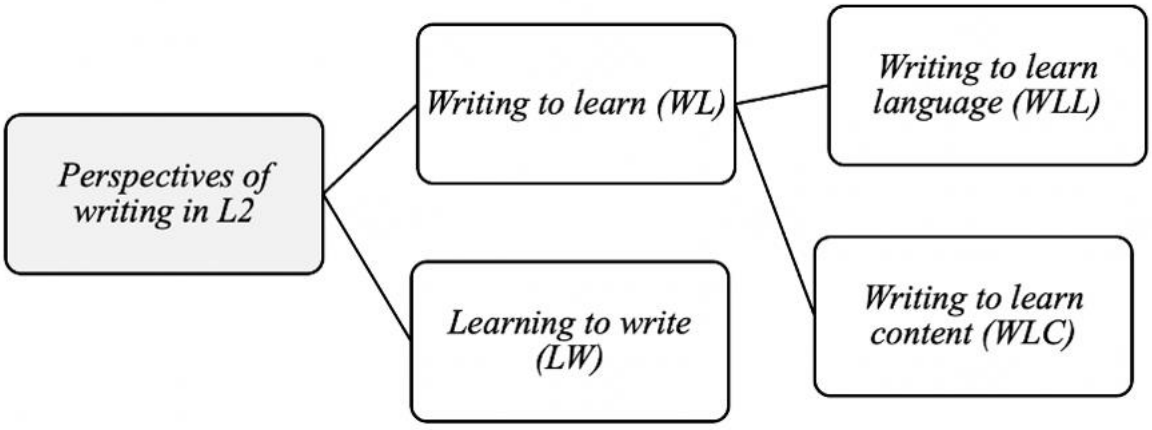

Figure 3. 1 Two different perspectives of writing in L2

3.2 Writing to learn

Manchón (2011) suggests that writing can be seen as a vehicle for promoting learning and that there are characteristics of the writing process that may support or facilitate this. Within the writing to learn (WL) perspective, she identifies **Writing to learn language (WLL)** and **Writing to learn content (WLC).** The first focuses on learning language (such as grammar, lexis and syntax) while Writing to learn content (WLC) focuses on the learning of content specific language and structures commonly covered on English for Specific Purposes (ESP) or Content and Language Integrated Learning (CLIL) courses (Hirvela 2011, p.39). Given that this study focuses on writing that is learned in a wide-angle EAP program that is designed to help students learn about writing for a range of future degree courses (Hyland 2016, p.20), this research will focus on the more generalized Writing to learn language (WLL) rather than the more subject specific area of Writing to learn content (WLC).

3.2.1 Writing to learn language

Manchón (2011) stresses that writing can be viewed as a tool for learning language. In specific terms, this refers to learning lexis, understanding how the new grammatical structures in the second language work and gaining an understanding of syntax. She suggests that research evidence exists on the role that written production (distinctly more than oral production) can have in engaging L2 writers in various learning processes (p.75).

Manchón stresses that writing provides L2 writers with a very different opportunity to learn language than that provided by speaking or oral communication; a view seconded by scholars such as Adams (2003), Niu (2009) and Williams (2012). This relates to how writing affects how learners process information and to its potential to draw their attention to how language is used. Writing also may help learners to notice gaps in their own knowledge of language which they may subsequently address. Manchón (2011) also suggests that there may be differences between how different writing processes, such as independent and collaborative writing, draw the learners' attention to language use (p.70).

Speaking and writing provide different opportunities to learn and process information

Writing is very different to speaking and also provides different opportunities to learn. There are aspects of writing that may facilitate language learning, and different types of writing such as collaborative writing or independent writing may also promote learning in different ways.

Manchón and Williams (2016) suggest that **the pace** and **permanence of writing** provide learners with more opportunities to analyze and to reevaluate the language that they have used (p.572) which provides a different opportunity to learn than that provided during speech.

The permanence of writing

Generally, speech is ephemeral, thus for learners to notice the differences between their speech and that of others, they must be able to hold both versions in memory and compare them after they have finished speaking whereas writing provides learners with a permanent record of their language use that they can refer back to (Adams 2003, p.349). The permanence of writing facilitates the processing of language use in that it provides learners with the opportunity to go back to their writing and to analyze, reevaluate and reconsider the language that they have used (Hirvela, Hyland & Manchón 2016, p.57) as well as to possibly notice holes in their own knowledge of language and attempt to address these gaps (Williams 2012, p.323; Manchón & Williams 2016, p 573).

The pace of writing

In general terms, oral communication is an on-going activity which occurs in real-time and there is a degree of pressure on fluent delivery (De Jong, Steinel, Florijn, Schooner and Hulstijn 2013, p. 893). De Jong *et al* (2013) point out that fluency in speech is characterized by smoothness and ease of oral linguistic delivery; therefore while speaking learners do not have the degree of freedom to pause, ponder and to go back and reevaluate the language that they have used as L2 students who complete writing do (Hirvela *et al* 2016, p.57). As Adams (2003) succinctly points out, "speaking is an online activity [thus] there is little time for erasing or drafting on speech" (p.349).

On the other hand, writing lacks the immediacy and time pressure of speech (Manchón & Williams 2016, p.571) therefore the pace of writing allows learners time to think about the language they will use in their writing. Schoonen, Snellings, Stevenson, and Van Gelderen (2009) stress that learners do not feel the pressure to produce language instantaneously and normally have time to (re)consider both the content and the wording of what they will write (p.81-82). Williams (2012) mentions that during the writing process learners also have more opportunities to consult with others or to access their own explicit knowledge of language while writing (p.323). This also provides an opportunity for learners to reconsider and possibly modify language use. As Polio and Lee (2017) succinctly point out the advantages of writing

are that it affords learners an opportunity to pause, monitor, and repair their language which are processes that could be considered markers of dysfluency in speaking (p.300).

Noticing, attention and focus on Form

Manchón (2011) suggest that writing can engage students in various learning processes associated with noticing, attention and focus on form (p.75). Scholars such as Schmidt (1990, 1995, 2001) in his noticing hypothesis of language learning and Swain (1995, 2000, 2005) in her output hypothesis have underlined the importance of noticing and attention in language learning. Scholars such as Swain (1995) have highlighted the need for learners to notice gaps in their own L2 knowledge resources, that is between what they *can* and *want* to say, in order for learning to take place (p.125-126).

Noticing

Manchón and Williams (2016) point out that gaps in knowledge of L2 can only be registered fleetingly during spoken interaction (p.573), but during writing learners have the opportunity to notice these gaps as well as the possibility to address them. Learners may notice or perceive that they do not know how to express their intended meaning (Adams 2003, p.348) however during writing learners can consult with experts and reference materials immediately in order to resolve this communication problem and have an opportunity to reflect upon their own explicit knowledge of language in order to address it (Manchón & Williams 2016, p.547). During collaborative writing, learners also have extensive opportunities to notice how language is used by peers, to compare this to their own language use, as well as opportunities to discuss how language is used. This may highlight gaps in the learner's knowledge or draw the learner's attention to how new expressions are used by his or her peer or how his or her use of language differs to that of this person.

Noticing and written feedback

The permanence of writing also allows learners to evaluate their use of language in their written work in relation to corrective feedback provided by their teachers and instructors. Hyland and Hyland (2006) suggest that in most L2 writing classrooms learners receive written corrective feedback (also permanent) which allows these learners time to reflect upon their language use in relation to the feedback provided by their instructors (p.84). Adams (2003) mentions that learners may notice the difference between corrective feedback on their work and how it differs from their own original attempt at writing (p.348). This process may prompt them to reevaluate

and modify the language that they use. However, Sheen (2010) stresses that the effectiveness of written corrective feedback may depend on the degree of explicitness of feedback provided; suggesting that explicit corrective feedback types, such as direct or metalinguistic correction, enable learners to notice the gap between their non-target output and the correct form (p. 226). Another criticism of written corrective feedback is that it lacks the immediacy of oral feedback and that it is far removed from when the student makes an error (Polio, 2012, p.385) thus possibly less salient. Weigle (2002) also points out that the absence of an addressee presents a challenge to writers that speakers do not face. While speakers receive immediate feedback from listeners on how well a message is being communicated, in general terms writers do not (p.18).

In terms of the frequency and type of feedback provided, there is a noticeable difference between collaborative and independent writing. Collaborative L2 writers receive continuous on-going oral feedback (that they can react to) during the process of writing as well as delayed written feedback from instructors (that they can reflect upon) after they have completed their work. The disadvantage voiced by Polio (2012) about delayed feedback during writing applies to independent writing, but not to collaborative writing which like speaking allows the learners to receive feedback in real-time. Manchón (2014) suggests that different types of feedback provided at different points in the composing process perform different functions (p.30) and it is clear that collaborative writing provides more variety in the feedback given to the learner then either speaking or independent writing alone.

Attention and focus on form

Manchón and Williams (2016) suggest that writing differs from oral communication because it provides more opportunity to focus on form. This stems from the slower pace of writing which provides learners with the possibility to evaluate and (re)consider the writing that they complete (Schoonen, Snellings, Stevenson & Van Gelderen 2009, p.81-82). As Polio (2013) points out, it should be easier to pay attention to form in writing than in speaking, simply because one has time to do so (p.383). Manchón and Williams (2016) also argue that there is a greater need to focus on form during writing than in speaking; meaning that writing is possibly more onerous than speaking in terms of the elements of form that the learner needs to think about while producing output (see Schoonen *et al* 2009, p.79-81). On the other hand, speaking can also draw the learner's attention to language use in other ways. The interlocutor provides continuous, real-time feedback in relation to language attempts that may also draw attention to language use. For example, interlocutor requests for clarification, gestures, or indications that

the learner's attempt at language has not been understood may also prompt the learner to think about language use although it is clear that the time constraints of speaking provide less time to do so. As previously mentioned, learners can also benefit from real-time peer feedback during collaborative writing that may allow them to focus on language use.

Attention and focus on form and collaborative writing

When reviewing previous research on the effects of the use of different modalities, such as writing and speaking on learning, Manchón (2011) suggests that linguistic processing is more likely to take place during writing than speaking. She also concludes that writing fosters a type of linguistic processing with potential learning effects, and that this is especially true of collaborative writing (p.70). The combination of oral communication and writing that takes place while students write collaboratively may prompt them to focus on form or to draw their attention to language use. Philp, Adams and Iwashita (2014) have also stressed that attention to form promoted by collaborative writing is likely to translate into learning gains for L2 students (p. 164).

When comparing different production modes in relation to focus on form, Niu (2009) noted that during collaborative writing, oral production and written production interacted closely in enabling learners to talk and to focus on language more. She also underlined the potential of collaborative writing to focus learner attention on language use, stating that collaborative writing tends to be able to draw learner attention to language forms more than oral communication alone (p.397). One explanation for this is that learners often engage in language related episodes (LREs) where students talk about the language they are producing, question their language use, or correct themselves or others (Swain and Lapkin 1998, p.326).

A number of studies have revealed that learners actively discuss language use while completing collaborative writing (Storch 2005; Dobao 2012; Storch & Wigglesworth 2007; Wigglesworth & Storch 2009; McDonough, Crawford & De Vleeschauwer 2016), or other related collaborative activities such as text reconstruction (Niu 2009; Malmqvist 2005; Basterrechea and Mayo 2013; De La Colina and Garcia Mayo 2007; Fortune and Thorp 2001) and text editing (Storch 2007; Hanjani and Li 2014). Niu (2009) also noted that learners engaged in more LREs while completing collaborative writing activities than collaborative output speaking activities. This researcher also noted that written output task drew learner attention to language forms to a greater extent than the oral output task in that its performers focused on more language features relating to lexis, grammar, and discourse (p. 396).

3.3. Learning to write

Manchón (2011) also suggests that second language writing can be seen in terms of **learning to write** (p.3). According to this lens, writing is something that L2 students learn to produce rather than simply being a vehicle for learning about content or language use. In this sense, writing is viewed as composing, or as the creation of text that another person will read and understand. The EAP or academic writing programs that provide the context for this study, such as those commonly carried out in pre-sessional or common core first year courses, have been designed to help students gain fluency in the conventions of relatively 'standardized' versions of academic writing which may be required in the future subject areas that they choose (Hyland 2016, p.20-23; Hyland 2018 p.383). Thus, they focus primarily on teaching L2 learners how to complete this type of writing.

3.3.1 Three different views of learning to write

Hyland (2011) argues that there are three different aspects, or ways of looking at learning to write. The first **focuses primarily on the learner** and on teaching the processes such as drafting, editing and revision involved in the writing process. Students involved in this study have already learned these processes while writing in their own language and consequently the learning of these elements will not be analysed in this study. The second **focuses primarily on the reader** which looks at how learners can tailor their writing to a particular audience or discourse community. Given that this study focuses on producing the standardized writing required for a range of educational contexts, this aspect will not be analyzed. This study considers the third and perhaps most prevalent view which is an understanding of **learning to write which primarily focuses on text,** that is what students need to learn in order to produce a particular piece of writing (p.19-31).

3.3.2 Learning to write which focuses on text

It is clear that an understanding of learning to write **which primarily focuses on text** cannot be considered without focusing on the learner, or needs of the reader to some degree, but it primarily involves what a student needs to learn to produce a particular piece of writing. To clarify this aspect of learning to write, it is helpful to look at the following question. If a second language student in an EAP program needs to learn how to complete an expository essay required for a range of possible future degree programs, what does this student need to learn?

In the simplest terms, Polio and Williams (2009, p. 487) stress that that L2 writing requires three of the following elements:

1) Learning a second language (L2)
2) Creating a text
3) Adapting the text to a specific discourse community

Given that learners in most preparatory EAP programs are required to produce more generalized academic writing with no particular subject area in mind, this study will focus on the first two of the three elements outlined by Polio and Williams (2009, p.487), that is (1) learning L2 and (2) creating a text.

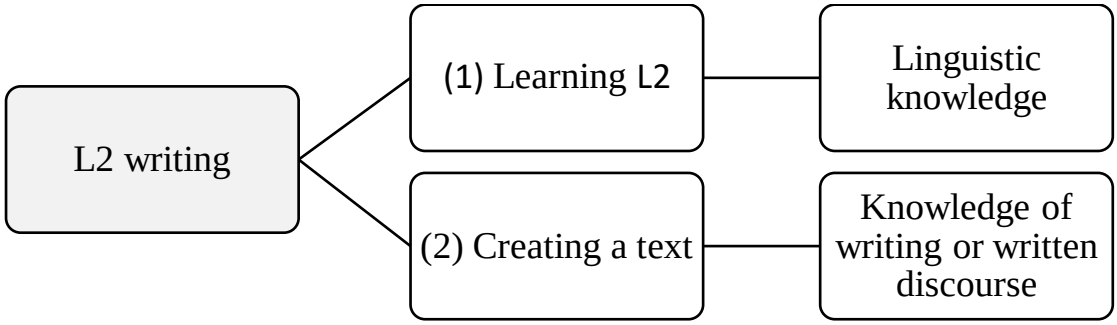

Figure 3. 2 What second language writers need to know

In reference to the question previously asked, it is clear that the student would need to learn new words and how to use grammatical structures in the target language to be able to complete the expository essay that he or she is required to write. This involves the learner's knowledge of language, or linguistic knowledge (see **linguistic knowledge** overleaf). Without the required range of lexis, or knowledge of grammatical structures the writer will not be able to clearly express his or her ideas in this type of writing.

Secondly, the student needs to learn about how ideas are arranged and presented according to the rhetorical conventions of the text which relates to the learner's knowledge of writing, or written discourse (see **3.4.2 Knowledge of written discourse**). To write an expository essay, the writer needs to learn how this type of writing should be structured and organized, how ideas can be linked so that they can be followed by the reader and understand what this person expects to see in the text. We could assume that learners would have acquired this knowledge of written discourse from completing the same type of (expository) writing in their own language, but there a number of problems with this assumption. While Rinnert and Kobayashi (2016) suggest that there is a degree of overlap between knowledge of L1 writing and L2

(p.371-372), they also stress that there are significant differences between the way writing is envisioned in different countries (Rinnert and Kobayashi 1996, p. 397-398); a point also made by Kaplan (1966), Hinds (1987) and Leki (1991). Thus, learning to write for a L2 learner not only involves learning language, but also learning about how writing is completed. These two elements will be reviewed in greater detail in the following section.

3.4 Two types of knowledge involved in learning to write

3.4.1 Linguistic knowledge

The second language writer's linguistic knowledge is important. Van Gelderen, Oostdam & van Schooten, (2011) suggest that in studies of writing it is generally assumed that linguistic competence is an important factor contributing to writing proficiency (p.282). This is reflected by the fact that elements of linguistic knowledge, such as knowledge of grammar and vocabulary, are repeatedly included in rubrics that have been used to assess L2 writing (Knoch 2011, p.81-95). Knowledge of language can affect the learner's ability to express his or her ideas through writing as well as the ability to produce cohesive and coherent texts. There are a number of different reasons why linguistic knowledge is important in L2 writing which are outlined in the following sections.

Knowledge of language determines how well L2 writers can express themselves.

In simple terms, knowledge of the second language determines what learners can express in their writing and a limited knowledge of language restricts what they can "say" in the texts that they produce. Schoonen, Van Gelderen, de Glopper, Hulstijn, Simis, Snellings & Stevenson, (2003) suggest that limited lexical resources seem to reduce writer's possibilities for expressing their ideas and that the writer's lexical knowledge, or vocabulary size, is likely to influence the quality of their texts (p.167). This is supported by a number of studies that seem to show a correlation between lexical knowledge and rating of L2 student writing (e.g. Engber 1995; Crossley and McNamara 2012; Llach 2011; Vo 2019). Grammatical knowledge, like lexical knowledge, determines the ideas that the writer can express. Coffin, Donohue and North (2009) stress that grammatical structures can also convey meaning. For example, modal verbs like **could, may, or might** can be used to express the writer's certainty of what he or she is saying (p.169-171). In the same way, writers may learn to use expressions such as **should, must** and **have to** in order to express the degree of obligation or urgency associated with a particular action or event (Vincent 2020, p. 1-3).

Errors in use of language may affect understanding and the communicative effectiveness of the writing produced.

Writing that has prevalent errors in language use may be difficult for the reader to understand. Ultimately, the objective of L2 writing is to convey the writer's ideas to the reader (De Beaugrande 1997, p.10). To do this, L2 writers must learn to address possible errors in their use of language that may impede understanding. Bitchener and Ferris (2012) stress that errors in writing are lexical, morphological, or syntactic deviations from the intuitions of a literate adult native speaker of the language (p.42). This can range from the use of language that is simply not "like" language used by first language writers, to errors in language use in writing that can impede understanding (Pallotti 2009, p. 592). The three examples cited below by Bitchener and Ferris (2012), Ellis (1995) and Engber (1995) illustrate the types of language errors made and their effect on writing quality and understanding.

> Yesterday I go to the park (Bitchener and Ferris 2012, p.42)
> He doesn't worry the cat (Ellis 1995, p.96)
> I can make my family hipe from me (Engber 1995, p.149)

Llach (2011) suggests that the severity of errors is judged either on the basis of the degree of communication distortion, or on the irritation the error produces to the reader/rater (p.66-67). The first example shown above does not affect understanding, and thus can be considered less severe than the other two examples. The second is ambiguous and thus the reader has to guess what the writer is trying to say. The most severe is the last example (cited by Engber 1995, p.149) where it is impossible to understand what the writer is trying to say because of the lexis that has been used.

There is a relationship between language proficiency and the frequency of error, or the accuracy of language use. One of the assumptions made by Wolfe-Quintero, Inagaki & Kim (1998) when assessing accuracy as a measure of linguistic competence is that as language proficiency increases the number of errors made will decrease (p.4). For example, a study carried out by Llach (2011) found that more advanced 6th grade learners made significantly fewer lexical errors in their writing than 4th grade students and that there was a highly significant correlation between lexical accuracy and writing assessment and a strong negative correlation between percentage of lexical errors and composition score. This scholar found that the more the lexical errors present in a composition, the lower the score obtained by that composition in analytic scoring (p.194). Similarly, when analyzing the features of 216 written compositions that had

received 3, 4, and 5 TOEFL essay scores, Cumming, Kantor, Baba, Erdosy, Eouanzoui & James (2005) found that the mean ratings of grammatical accuracy increased by proficiency level of the writer (p.5, p. 22-23).

Knowledge of second language can affect how writing is organized and arranged

Van Gelderen, Oostdam, and Van Schooten (2011) suggest that when second language writers have no efficient access to lexical or grammatical knowledge, this may become an impediment for attending to other (higher order) aspects of writing (p.283). Weigle (2002) stresses that the necessity of devoting cognitive resources to basic language issues may mean that not as much attention can be given to higher-order issues such as content and organization (p.36); a point seconded by Van Gelderen *et al* (2011, p.283). Conversely, Schoonen, Van Gelderen, Glopper, Hulstijn, Simis, Snellings & Stevenson (2003) point out that fluent or automatic accessing of lower-level (linguistic) knowledge resources may free up writers' attentional resources and therefore may leave sufficient cognitive capacity for other attention consuming, higher-level processes of writing such as text structuring (p.169). While L2 writers may have sufficient time to attend to different aspects of writing, given the slower pace of the writing procedure and the possibility for them to go back and revise their work, Weigle (2002) notes that it has been demonstrated that inexpert writers tend to revise local, sentence-level errors instead of global errors such as those related to content and organization (p.27); a point also made by Révész and Michel (2019, p.492). If attention is selective as scholars such as Ellis (2006) suggest, then language learners may devote most of their attention to the areas of writing that they have difficulty with, such as language use, rather than less salient issues related to textual coherence and cohesion. On the other hand, extensive knowledge of language use may allow learners to focus on more global, less sentence-level issues that can affect their writing.

3.4.2 Knowledge of written discourse

Second language writers not only have to learn language to express their ideas, but they must also learn how writing works in this new language. Scholars in the field of contrastive rhetoric such as Kaplan (1966), Hinds (1987), Rinnert and Kobayashi (1996, 2016) and Leki (1991) have shown that there are significant differences between the way writing itself is envisioned in different countries. These differences may mean that L2 writers have to learn about how writing is organized and presented according to the expectations of the reader and how this differs to their knowledge of writing in their own language. The learner's understanding of

how writing should be presented, referred to as the rhetorical pattern, may influence the coherence of the ideas presented to the reader and the linking, or cohesion of ideas within the text.

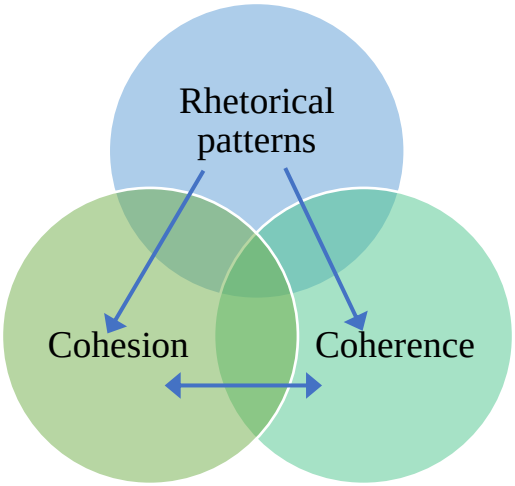

Figure 3. 3 The relationship between rhetorical patterns and cohesion and coherence in writing

3.5 Different culturally influenced rhetorical patterns or strategies

To illustrate this point, it is useful to look at how writing is presented and organized in different writing cultures. Kobayashi and Rinnert (1996) have highlighted the existence of different culturally influenced rhetorical patterns or writing strategies. These are culturally preferred ways to present and organize the information that writers put forward which may differ from one culture or language to another (p. 397-398). Leki (1991) points out that L1 rhetorical patterns or writing strategies may be different to those employed in English-medium universities, and therefore possibly ineffective in the new context (p.124). Weigle (2002) stresses that a mismatch between the expectation of the reader and the rhetorical pattern or strategies employed can lead to a negative assessment of the writing produced (p.22). Thus, it is important for L2 writers to learn about the rhetorical patterns or writing strategies that are aligned with what the reader expects to see. Additionally, the cohesion and coherence of writing may be affected by the rhetorical pattern employed. To illustrate this, it is useful to look at two different ways to understand how writing can be presented and organized.

3.6 Deductive vs Inductive rhetorical patterns and reader expectations

3.6.1 Deductive rhetorical pattern

Weigle (2002) stresses that native speakers of English expect writing to be hierarchically organized with explicit connections between ideas (p.22). However, this may not be expected

in other cultures. Rinnert and Kobayashi (1996) state that English writing employs a **deductive rhetorical pattern** where writers make clear the argument that they wish to present at the beginning of their piece of writing (in the introduction) and then present a number of different supporting points (in the following paragraphs) to support this. There are clear links or transitions between the supporting ideas in the form of explicit transition signals, such as "firstly", "in addition" and "finally" that provide a road map for the writer's train of thought which leads to a conclusion where the writers argument is restated (p.404-406). Hinds (2001) has characterized English as a **writer-responsible language** because it is up to the writer to clearly convey their message to the reader and to present their ideas in a way that can easily be followed or understood (p.65).

3.6.2 Inductive rhetorical pattern

On the other hand, Kobayashi and Rinnert (1996) stress that other languages such as Japanese employ **an inductive rhetorical pattern** where writers only mention the topic area in the introduction, but do not outline their position or opinion until the end of their writing, or may not present a clear position at all, leaving it up to the reader to make up their mind about the topic after reading the information presented (p.406). During this rhetorical stroll through the topic area, there is less pressure on the writer to present tight transitions that segue between supporting points which Kobayashi and Rinnert (1996) suggest leads to looser connections between paragraphs and more implicit, less tightly structured transitions (p.406). Hinds (2001) has characterized languages such as Japanese as a **reader-responsible language because** it is the readers responsibility to dig-out the writer's meaning, or to interpret the message they indirectly wish to convey (p.65). Hyland (2003) suggests that the significance of transitions signals may not always be obvious to L2 writers from more reader-responsible cultures (p.48) given that there is less pressure to use them than in **writer-responsible languages** like English.

However, some scholars have stated that the previous categorization is overly simplistic and that in the globalized world that we live in, it is difficult to assign one particular rhetorical pattern based upon nationality or culture (Kubota and Al Lehner 2004, p.9; Belcher 2014, p.60). This is a valid point, but educators still cannot assume that everyone writes in the same way, or that L2 writers will know how to write according to the expectations of the target language community, given that differences between the way writing is completed may exist. With this in mind, it is reasonable to assume that L2 students may also learn how text is organized and

arranged in the writing of the target language community, and specifically how this differs to how writing is presented in their own culture.

3.7 Using L1 rhetorical patterns in L2

Using L1 writing strategies that differ significantly from the expectations of the reader can be problematic. Weigle (2002) stresses that native speakers of English expect writing to be hierarchically organized with explicit connections between ideas. This scholar suggests that an English-speaking reader is apt to find the writing of a person who comes from a reader-responsible language culture difficult to read, poorly organized, or excessively vague (p.22). A number of studies have analyzed the effect of L2 writers employing L1 writing strategies while writing in English. Takano (1993) stresses that the readers' comprehension of texts is significantly affected by their native expectations of rhetoric. This scholar suggests that the conflict between the readers' rhetorical expectations and the writers' rhetorical strategies is a major factor in hampering readers' comprehension and found that the typical L1 strategies employed by Japanese students writing in English significantly hampered the comprehension of native English-speaking readers of their texts (p.56, p.71).

When reviewing teacher assessment of writing produced by L2 writers employing either L1 or L2 rhetorical patterns, Kobayashi and Rinnert (1996) found that native English teachers generally prefer more conformity to features of the English rhetorical pattern (p.425) however they had a less negative assessment of writing employing L1 writing strategies than in the study carried out by Takano (1993).

More recently, Taft, Kacanas, Huen and Chan (2011) found that when rating a series of randomly presented, anonymized essays written in English by Chinese, Spanish and English writers, raters from these countries consistently preferred the rhetorical structure of the essays completed by people from their own countries over those produced by writers of the other two, even though there was no indication of the nationality of the writer (p.508-509).

3.8 Learning about different rhetorical patterns or writing strategies in L2

The objective of EAP programs is for second language writers to learn to produce the types of writing required in their educational programs and to do this they must learn about how writing works in this context. This involves understanding what is expected by the reader and producing writing that is aligned with these expectations. Petrić (2005) stresses that students

may initially be unaware of the culture-specific nature of the writing conventions of their native language and that these differ from the target language community (p.224). In relation to this, Fang (2007) suggests that L2 writers should be made aware of the typical English rhetorical organization expected in an academic discourse community and that L2 students should learn how the rhetorical patterns or writing strategies are used (p.76).

Petrić (2005) found that after studying an English academic writing program, the rhetorical features of L2 student writing began to align with those of the target language and thus with the expectations of the reader (p.224-225) possibly because students came to understand how writing was presented in this language and how this differed to how it was organized and presented in their own. If the objective of EAP programs is to help students learn to produce the writing expected in their future educational programs, then L2 writers must learn to write according to the expected conventions of each text. This includes learning about when and where information should be presented in written discourse and how ideas should be connected and linked to one another so that the writer's ideas can be followed and understood.

One of the advantages of writing collaboratively is it allows students to discuss and potentially learn about how to present and organize the ideas that they wish to outline in the coauthored text. While completing collaborative writing, writers must agree upon the presentation and organization of their co-authored written work (Storch 2005, p.159, p. 164-165; Wigglesworth and Storch 2009, p.453). As a result, they must discuss how to arrange and present their ideas according to the rhetorical conventions of the text. While writing collaboratively, Fortune and Thorp (2001) found that students engaged in discourse related D-LREs about the organization and cohesion of the coauthored text. This deliberation about the ordering, arrangement, and presentation of ideas in text may allow students to learn about the rhetorical conventions of the writing that they will produce and how these differ to how writing is presented in their own language.

3.9 Cohesion in writing

Cohesion in writing is achieved through the use of linguistic devices that tie ideas together across a text and is an important element in the development of coherent writing (Struthers, Lapadat, & MacMillan 2013, p.187). Hyland (2003) points out that the significance of transition signals used to connect ideas within the text may not always be obvious to L2 writers (p.48). Students may therefore need to learn how to connect the ideas they present in the writing

that they produce and that is why coherence is one element of learning to write that will be analyzed in this study.

Hinkel (2004) mentions that cohesion refers to the connectivity of ideas in discourse and sentences to one another in text, thus creating the flow of information, or to the ways of connecting sentences and paragraphs into a unified whole (p.279). To do this, the writer can use a set of lexical and grammatical linguistic resources (often referred to as cohesive devices) to link one part of a text to another (Mortensen, Smith-Lock & Nickels 2009, p.741). With this in mind, Celce-Murcia, Dörnyei and Thurrell (1995) stress that cohesion is the area of discourse competence most closely associated with linguistic competence because the reader needs to have grammatical and lexical knowledge in order to produce writing that is cohesive (p.14).

3.9.1 Cohesive devices

The cohesive devices that are used to connect a piece of writing are diverse and can be categorized in various different ways. They can be used at a global level to show the connection between different sections or paragraphs of a text, to connect or illustrate the relationship between sentences within a paragraph, or even to link different ideas within a sentence which can be referred to as global, inter, or intra-sentential level cohesion (Morgan 2010, p. 280).
The cohesive devices outlined by Halliday and Hasan (1976; 2014) in their seminal work that will be assessed in this study are:

1) Conjunction (p.226-273)
2) Reference (p.31-87)
3) Lexical cohesion (p.274-292).

Two other cohesive devices outlined by these scholars, substitution and ellipsis, are not examined in this study because as Yang and Sun (2012) point out, these two devices are more characteristically found in dialogues and seldom used in formal written discourse (p.40). Examples of these devices in written discourse are shown overleaf.

Example 3. 1 Examples of cohesive devices used in writing

Cohesive device	Example of use
Conjunction	**First**, people go to school. **Afterwards**, they go to university.
Reference	**Students** are often overworked. **They** study quite a lot.
Lexical cohesion	**Going over** your work is necessary, but **checking** it takes a lot of time.

3.9.2 The link between cohesion and second language writing.

A number of studies have highlighted the importance of cohesion in relation to the assessment of second language writing. Scholars such as Yang and Sun (2012) have found that the correct use of cohesive devices had a significant positive correlation with writing quality irrespective of L2 proficiency (p.44) and found that there was a significant linear decrease from the number of cohesive errors made by intermediate level learners to the number of errors made by advanced level L2 writers (p.46).

Mirroring this, a study carried out by Martinez (2015) found a positive significant relationship between conjunction density and composition global scores. She also found the more advanced fourth grade students included more cohesive conjunctions in their writing when compared to the writing of less advanced third grade students (p.45).

Similarly, Liu and Braine (2005) found that composition scores correlated highly with the use of cohesive devices (p.631) and that there was a significant relationship between the number of cohesive devices used and the quality of the argumentative writing created by undergraduate L2 writers (p.634). As we have seen, cohesion in writing is important and students must learn to connect their ideas, so that they can be fully understood. Collaborative writing (possibly more than independent writing) provides students with the opportunity to learn about cohesion as they write because learners have to discuss the organization and structuring of their co-authored text and how ideas should be connected to each other (Niu 2009, p.390-391; Fortune and Thorp 2001, p.149).

3.10 Coherence

A definition of coherence provided by Celce-Murcia, Dörnyei and Thurrell (1995) highlights two important elements of this. Coherence refers to **ease of interpretation**, that is to whether the sentence or ideas presented can be understood, and also to whether the sentences in a discourse sequence are **interrelated** (thus easy to follow) or unrelated or out of synch with one another (p.15). In reference to this definition and for the sake of simplicity, I will refer to coherence as how easily the ideas presented by the L2 writer can be followed and understood. While coherence and cohesion are often mentioned together, they are not exactly the same. Crossley and McNamara (2010) have suggested that coherence refers to the understanding that the reader derives from the text whereas cohesion refers to the presence of explicit cues (or words) that allow the reader to make connections between the ideas in writing (p.984).

When producing a coherent text, a L2 writer must consider the expectations of the reader and how their intended message will be followed and understood. First and foremost, text is a communicative event and not just the sequence of words that were uttered or written (De Beaugrande 1997, p.10). Therefore, to produce coherent writing, L2 writers must have a thorough understanding of reader expectations. Given that different cultures can employ dissimilar rhetorical patterns or writing strategies, students must learn how to arrange their ideas in writing to conform to the expectations of the reader so that they can be clearly understood.

3.10.1 Learning to write coherently

Lee (2002) stresses that coherence is a fuzzy concept which is difficult to teach and learn (p.135). One problem is that coherence is learned implicitly (Ortega, 2011) therefore it is difficult for any educator or student to explain **how** it is learned. As coherence relates to implicit knowledge, it is intuitive (Philp 2009, p.194). As a result, students learn to **feel** when the language used to express their ideas is correct rather than learning rules about its use (Ellis 2006, p.434).

One possible advantage that collaborative writing has over independent writing in terms of learning about coherence relates to how text is produced. During collaborative writing, writers must create a coherent, co-authored piece of writing that both writers agree upon (Higgins, Flower and Petraglia 1992; Keys 1994; Elola and Oskoz, 2010). To do this, they must discuss how well each idea can be understood. Another advantage is that collaborative writing provides each learner with a ready-made "audience", or sounding board to verify the coherence of the proposals that he or she makes for the coauthored text (Storch 2013, p.23, p.42). While writing collaboratively a partner can indicate (in real-time) that the person's proposal cannot be completely understood, or even counter-suggest ways to express this idea so that it can. Storch (2013) notes that during collaborative writing learners suggest and counter-suggest alternative ways of expressing ideas for their final co-authored text (p.42). This process may allow both writers to intuitively learn about how ideas can be expressed coherently. During collaborative writing, Storch (2013) also believes that even what is considered to be implicit knowledge can be made "explicit" as learners are pushed to create an explicit representation of internalized knowledge about coherence in writing so that it can be verified or discussed (p.18).

To date, studies into the use of collaborative writing in L2 have mainly focused on its effect on language use and not on the coherence of the text produced nor on whether the process of collaborative writing helps students to learn about how to make writing cohesive (e.g. Storch 2005; Dobao 2012; Storch & Wigglesworth 2007; Wigglesworth & Storch, 2009). This will be analyzed in the research that I carry out.

3.11 The link between learning to write and writing to learn in EAP

As previously mentioned, Manchón (2011) has suggested that second language writing is a process that can facilitate learning (representing the **writing to learn** view) and at the same time L2 students also need to learn how to compose or to prepare the writing needed for future educational programs which she refers to as **learning to write** (p.3). Manchón (2011) recognizes that in some educational contexts, learning to write and writing to learn are inseparable from one another (p.3-5) and this is particularly true of English for Academic Purposes programs.

In EAP programs, students clearly need to learn to write. However, learning to write in this context does not solely imply learning how to compose written texts, but also learning how the second language is used to convey the learner's ideas in writing. Polio (2019) stresses that L2 writing instructors also need to help second language writers expand their linguistic resources so that they will have a larger arsenal of vocabulary, grammar, and the knowledge about how language can be used to communicate through writing appropriately (p.1). In EAP, writing can be seen as a vehicle to learn about these two facets of producing written discourse. Through extensive writing practice in EAP programs, students learn about how language is used in writing through instructor feedback on their individual writing. Writing also provides students with a context to learn about written discourse. They receive feedback on rhetorical aspects of text, such as feedback on the organization and arrangement of ideas in writing, comments on the appropriate use of cohesive devices within the text and feedback on the coherence of the work that they produce. In this context, writing may therefore be seen as both a **writing to learn language** and a **writing to learn about writing** activity. While students in EAP courses predominantly write independently (see Bhowmik, Hilman & Roy 2019, p.2), it is also possible to use collaborative writing as a means or context for L2 students to learn.

Shintani (2019) suggests that writing-to-learn activities should provide learners with input that they can utilize in their writing, ask learners to write their own texts referring to the input provided, provide feedback to the learner, and require learners to revise and possibly rewrite

the text that they have produced (p.1). It is possible that collaborative writing is actually more aligned with the criteria of a writing-to-learn activity as proposed by Shintani than the independent writing that learners commonly carry out. When comparing the highly interactive process of writing collaboratively and independent writing, it is clear that learners receive more input and feedback while writing collaboratively than their counterparts who complete independent writing. Collaborative writing is also typified by the continuous reviewing of language to be used in the coauthored text, and the proposing and counter-proposing of ways to express ideas that both learners can agree upon (Storch 2013, p.156). With this in mind, collaborative writing may also provide educators with another possible writing-to-learn activity that they can use in their EAP courses.

Collaborative writing can provide students with another, very different opportunity that allows them to learn about different aspects of writing. During collaborative writing, Storch (2019) stresses that all aspects of writing are discussed, ranging from the use of language, mechanics (such as spelling and punctuation) to the structuring and linking of ideas within the co-authored text (p.146). The interactive processes that occur during collaborative writing may promote learning, but to date the learning potential of this writing activity has yet to be fully assessed (Dobao 2012, p.42, Storch 2013, p.169).

4. Learning and interaction

Writing, unlike speaking, is not a process that is synonymous with interaction. Ede and Lunsford (1990) suggest that the pervasive assumption is that writing is inherently and necessarily a solitary and individual act (p.5); a point also made by other scholars, such as Manchón (2011, p.7) and Storch (2019, p.40). However, L2 learners may benefit from writing collaboratively with their peers and the interaction that takes place while students write together may provide them with opportunities to learn that are not provided by writing independently. As Manchón (2011) points out writing can be used to learn (p.3); both to learn language and possibly to learn about how written discourse is produced. In this section, I will look at how the interaction that takes place during collaborative writing may facilitate learning, and thus how the highly interactive collaborative writing process may differ from independent writing in regard to the learning opportunities provided to students. Before doing so, I will firstly review what learning is in order to look at how possible learning through collaborative writing in L2 may be identified, measured and assessed.

4.1 What is learning?

To look at what can be learned through collaborative writing and peer interaction, we firstly need to define what learning is, given that *learning* like *family* is understood in many different ways. What one person may define as *family* may be different to another and in the same way different approaches to second language acquisition view learning in slightly different ways. The way learning is assessed is also driven by the approach that is taken and therefore I will briefly outline the approach to L2 learning employed in this study before providing the definition of learning that will be used.

This research looks at learning from a sociocognitive/ interactionist perspective. Proponents of the sociocognitive approach such as Batstone (2010) see language learning as an activity that is neither primarily cognitive (or *individual*), nor primarily social, but is an activity which has both social and individual cognitive dimensions (p.3-5). Philp, Adams and Iwashita (2014) point out that learning from a sociocognitive perspective (reflected by the interaction approach) is seen as an individual cognitive process that is facilitated by interaction with others (p.8). Because learning is an individual process, but one which is promoted by interaction with others, we can consider what individual students learn ***from*** working with their peers while writing collaboratively. We can also gauge what students learn ***from*** the process of writing collaboratively by assessing changes in the individual writing that they subsequently produce.

4.2 Learning from a sociocognitive perspective

From a sociocognitive perspective (reflected by the interaction approach), learning is seen as an individual, cognitive process that is facilitated by interaction with others (Philp, Adams and Iwashita, 2014, p.8). Interaction allows the individual learner to acquire knowledge about the target language and about how this language is used in writing. For example, a learner may acquire knowledge about a new word, by noticing how this word is used by others, by asking what it means, or by discussing its use with peers and teachers. Peer interaction also allows learners to receive continuous feedback from their partners that may help to shape or update their knowledge of language (Weigle 2002, p.18; Storch 2005 p.168). For example, Mackey and Gass (2014) point out that through interaction learners receive feedback and information about the correctness and more importantly about the incorrectness of language attempts (p.183) which may prompt the learner to reevaluate, or reassess the language that he or she uses. The success of new attempts at language use can also be gauged by peer feedback provided.

Interaction does not only allow learners to acquire knowledge about language use. While completing collaborative writing, a L2 writer can also acquire knowledge about written discourse from working with his or her peer. This may relate to how ideas should be organized and presented in writing according to the rhetorical conventions of the co-authored text that these writers will produce. During collaborative writing, learners are obliged to discuss the writing that they will create (Storch, 2016, p. 387); reviewing each idea that they present and discussing how these will be arranged in the co-constructed collaborative text (Fortune and Thorp, 2001, p.149). This discursive process provides students with the opportunity to learn about coherence and cohesion in writing and to possibly re-evaluate or reassess their ideas about them.

The sociocognitive view of learning in L2 aligns with the acquisition metaphor of learning outlined by Sfard (1998) which views learning in terms of the individual acquisition of knowledge and internalization of this information. However, while learning in itself is an individual process, situated within the mind of the learner (Philp, Adams and Iwashita, 2014, p.8), it is one which is facilitated by interaction with others, and in the case of collaborative writing by interaction with peers. As learning is individual, we can consider it on *individual* terms, thus we can evaluate or assess individual learning.

4.3 Why learning is viewed from a sociocognitive perspective in this study

The reason why I look at learning related to completing collaborative writing in L2 from a sociocognitive perspective and according to the interaction approach (see section 4.6) relates to two primary beliefs about how L2 students learn to write.

Firstly, that learning is an individual cognitive activity, but one which may be facilitated by interaction with others; a view reflected by the sociocognitive perspective of learning in L2. This view accounts for the fact that L2 writers **can** and **do** learn to write individually (or independently), but also allows for the possibility that students may learn while working with their peers. As learning is individual, what individual students learn from completing collaborative writing with peers can also be assessed. This means that individual learning can be measured as a result of carrying out collaborative writing.

Secondly, that learning primarily involves the individual learner's acquisition of knowledge. Learning to write in a second language is a knowledge intensive endeavor. It requires the L2 writer to learn a vast array of new words in this language and to understand how grammatical structures are used to be able to express his or her ideas through writing clearly and precisely (Schoonen, Stoel, Hulstijn, & de Glopper 2011 p.32-33). An L2 writer must also learn about how his or her ideas can be presented, connected and arranged in written discourse given that the rhetorical patterns used in L2 writing may be very different to the ones used in his or her first language (Leki 1991, p.124; Kobayashi & Rinnert 1996, p. 397-398; Hinds 2001, p. 65; Fang 2007, p.76).

4.4 The definition of learning used in this study

Learning in this study is defined as the individual's acquisition of knowledge about the target language and how this language is used to produce coherent and cohesive written discourse. While the acquisition of this knowledge is an individual cognitive process, the knowledge itself is provided by the learner's social environment and learning may be facilitated by interaction with others. The learner's knowledge of language is reflected by his or her language use in writing and learning can be inferred by changes in how language is used. Knowledge of cohesion and coherence in written discourse may also be reflected in the same way.

4.4.1 Justification for the definition of learning used in this study

To justify the definition of learning used, I will explain the three different parts of this definition that refer to the acquisition of knowledge, the relation between learning and the learner's social environment and how learning can be revealed by changes in the learner's individual writing.

Learning in this study is defined as the individual's acquisition of knowledge about the target language and how this language is used to produce coherent and cohesive written discourse.

Second language students learn to write in order to be able to express their ideas in writing in a clear and precise way. (Schoonen, Stoel, Hulstijn, & de Glopper 2011, p.32-33). To do so, they must learn new language, such as new words and grammatical and sentential structures to express their ideas clearly and at the same time learn to correct errors in language use that may impede understanding (Pallotti 2009, p. 592). Students must also learn about written discourse and about how sentences are arranged and presented coherently and connected cohesively so that they can be followed or understood (Celce-Murcia, *et al* 1995, p.14-15). Each learner must acquire knowledge (either explicit or implicit) about both of these facets in order to be able to write in a second language.

Acquisition of this knowledge is an individual cognitive process, but the knowledge itself is provided by the learner's social environment and learning may be facilitated by interaction with others.

The view presented in this paper is that learning is the individual acquisition of knowledge and internalization of this information. It is a cognitive process that is situated within the mind of the learner (Philp, Adams and Iwashita, 2014, p. 8). As learning is individual, we can consider it on *individual* terms, thus we can evaluate, or assess individual learning. However, knowledge is provided by the learner's social environment and the individual's acquisition is also facilitated, or prompted by interaction with others, thus learning is neither purely individual nor purely social (a view taken by sociocognitive theorists), but it is **both** (see Batstone 2010, p.3-5). For example, a learner may acquire knowledge about a new word, by noticing how this word is used by others, by asking what it means, or by discussing its use with peers and teachers.

The learner's knowledge of language is reflected by his or her language use in writing and learning can be inferred by changes in how language is used. Knowledge of cohesion and coherence in written discourse may also be reflected in the same way.

Learning to write in L2 (from a sociocognitive perspective) involves the individual student's acquisition of knowledge about language and discourse and it is possible to measure individual learning that may result from completing either collaborative or independent writing. Scholars such as Bulté and Housen (2014) stress that the individual learner's knowledge about language is revealed by his or her language use in writing and a comparison of writing produced at different points of time can reveal changes in language use that are indicative of language development and learning (p. 43). Accordingly, we can measure learning by assessing changes in language use between individual writing produced before (pre-test) and after (post-test) either collaborative or independent writing have been completed. In this study, this involves knowledge about language used in writing (such as lexis, grammar, and syntax) and knowledge of written discourse (relating to coherence and cohesion in writing).

4.5 What types of knowledge do EAP second language writers need?

Second language writers taking part in an EAP or academic writing course need to acquire knowledge about the target language (linguistic knowledge) and at the same time learn about how written discourse is produced (knowledge of written discourse). It is possible that collaborative writing provides different opportunities to learn about these two areas than those provided by independent writing.

4.5.1 Linguistic knowledge

Second language writers need to learn about the target language to be able to express themselves clearly in writing (Polio 2019, p.1). Schoonen, Stoel, Hulstijn, & de Glopper (2011) stress that L2 writing is an activity the draws heavily on the linguistic resources that a learner has (p.33). Limited lexical resources seem to reduce writers' possibilities for expressing their ideas and the writers' lexical knowledge, or vocabulary size is likely to influence the quality of their texts (Schoonen, Van Gelderen, de Glopper, Hulstijn, Simis, Snellings & Stevenson 2003, p.167). In this study, the learners' linguistic knowledge is reflected by their use of grammar, lexis, and syntax in writing. The writer's ability to use these elements is referred to as their linguistic competence.

When students complete collaborative writing, a learner may notice how language is used by his or her peer. This learner can also discuss language use with his or her partner through LREs (Swain and Lapkin 1998) and receive corrective feedback from this peer about incorrect language use. Herder, Berenst, de Glopper and Koole (2020) also stress that collaborative writing provides learners with a context to share knowledge with their peers (p.14). A number of these processes are revealed in an excerpt of recorded dialogue of two students completing collaborative writing in this study which is shown below.

Example 4. 1 Example of a language related episode

S2 Food **was**… very important element … like food, fish and rice,
camel milk was important element in their diet.

S1 Food **is** a….

S2 Ah… **was** very important element.

S1 **Was,** *or* **is**?

S2 **Was** *because it was in the past.* [From collaborative dialogue 51]

In this example, a student (S1) notices how her peer (S2) uses **was**, and counter proposes **is**; she then receives **feedback** related to this proposal (e.g. Ah… **was**) and then learners discuss the use of this structure in a form-focused language related episode referred to by Storch (2007, p.148) as an F-LRE. The interactive processes seen in the previous example allow students to learn about language use while they are completing collaborative writing.

4.5.2 Knowledge of written discourse

The second language writer must know how ideas in written text are presented, arranged and connected to one another according to the conventions of the completed text. This is referred to as discourse competence (Celce-Murcia, Dörnyei & Thurrell 1995, p.13). As previously mentioned, there may be differences between written discourse in different languages (see Kaplan 1966; Hinds 1987; Leki 1991; Rinnert and Kobayashi 1996, 2016), so we cannot assume that all writing is the same.

Students can also acquire knowledge about written discourse while writing collaboratively given that they need to discuss the rhetorical aspects of the text in order to produce their co-authored piece of writing. This may refer to explicit information about the inclusion and positioning of elements such as the thesis statement and topic sentences within the text (Fang, 2007, p.7; Petrić p.221-222), or to the connection and organization of ideas using transition

signals. The following example shows how peers can provide explicit information about the rhetorical elements of the text while completing collaborative writing.

Example 4.2 One peer providing explicit information about the rhetorical elements of the text

S2 You have to write such as fish and rice… **give example or no need**?

S1 Not the first sentence… **the definition or main idea first**… so **the first sentence we have to describe the whole paragraph in one sentence.**

S2 Okay.

S1 Let's write. [From collaborative dialogue 93]

In this example, S1 draws her peer's attention to the need to include **a topic sentence** that gives an overview of the paragraph to be completed. Though perhaps somewhat unclear, it provides an opportunity for S2 to learn about the rhetorical elements of the text.

4.6 The interaction approach

This study is informed by the interaction approach which represents a sociocognitive view of learning. It is an approach to learning that outlines the interactive processes that can facilitate acquisition of knowledge about the target language and in the case of collaborative writing about knowledge of written discourse. The interaction approach has been defined by Gass and Mackey (2014) and stems from the interaction hypothesis proposed by Long (1996). It has also been influenced by other theories related to interaction, such as the input hypothesis (Krashen 1982, 1985), the noticing hypothesis (Schmidt 1990, 1995, 2001), and output hypothesis (Swain, 1993,1995, 2005).

In the simplest of terms, the interaction approach attempts to account for learning through the learner's exposure to language, production of language, and feedback on that production (Mackey and Gass 2014, p.181). Gass and Mackey (2007) stress that, within SLA literature, it is now commonly accepted that there is a robust connection between interaction and learning (p. 176); a point also made by a number of other scholars such as Nassaji (2016, p.537). Mackey, Abbuhl, and Gass (2012) suggest that within peer interaction there are a "constellation of features" that may facilitate learning (p.10). I will review these specifically in relation to how the interaction that occurs while students write collaboratively may affect how they learn.

4.7 Interactional processes that can facilitate L2 writing related learning

As Mackey, Abbuhl, and Gass (2012) suggest, within peer interaction there are a number of different features that may facilitate learning (p.10). These relate to language input, language output, noticing, attention to form, peer feedback, language related episodes, experimenting with language and hypothesis testing, language modification and deliberation about the content and organization of the co-authored text.

Up until now, the interaction approach has been more commonly associated with spoken language however researchers have begun to look at whether writing in second language learning can also benefit from increased interaction (Polio, 2013). Unlike individual writing, collaborative writing promotes interaction between peers (Storch, 2016) and therefore perhaps provides a different opportunity to learn. McDonough, Crawford & De Vleeschauwer (2016) point out that, "from an interactionist standpoint, collaborative writing elicits communication between students, thereby creating opportunities for interactional adjustments, such as negotiation of meaning, feedback, and modified output, which can facilitate second language development," (p. 186). I will briefly look at how the different features of interaction highlighted by Mackey, Abbuhl, and Gass (2012) may facilitate learning; specifically in relation to how the interactive processes that occur throughout collaborative writing may help students to learn about language use and about how written discourse is produced.

4.7.1 Language Input

The language produced by peers (or *input*) is related to learning in a number of different ways. Firstly, it provides learners with an additional source of knowledge about language. In traditional classrooms, the primary source of language input is the teacher and the textbooks provided however this situation changes when activities involving peer interaction are introduced. The provision of continuous, real-time language input from peers allows learners to notice how language is used by them (Schmidt 1990, 2001) as well as to identify new words and expressions that they may try out for themselves (Philp et al, 2014); possibly adding these to their own language repertoire. An indication of this process was provided by a participant (Noriko) in a study into collaborative writing carried out by Storch (2005):

> I just watch vocabulary or . . . what vocabulary he was using, he used and …Well if he used the vocabulary which I didn't know, I tried to use it for next time. (p. 167).

Peer language input is not only a new source of information about language use, but also provides learners with examples of language that they can compare their own use of language to. Learners may also notice how language is used by their partners and how this differs to their own understanding. For example, if a peer uses a different grammatical structure, e.g. he works in an office, to the one the learner currently uses, e.g. he work in an office, then this may prompt this learner to re-evaluate, or re-consider his or her knowledge of how language is used in this context, to ask for clarification from peers, or even to discuss how language is used. This process may lead to language modification and to update the learner's knowledge about language use.

4.7.2 Feedback

One of the benefits of carrying out collaborative writing is that learners receive continuous real-time feedback related to their language attempts. Mackey and Gass (2014) stress that learners receive information about the correctness and more importantly about the incorrectness of their utterances (p.181). For example, they may receive negative feedback, such as indications from peers that their language attempt has not been fully understood which may prompt them to reformulate their language attempt. After receiving negative feedback, Mackey and Gass (2014) suggest that the learner then needs to come up with a hypothesis as to what the correct form should be. This new hypothesis may be confirmed by subsequent feedback provided by peers indicating that the attempt has been understood, or disconfirmed by further requests for clarification (p.183). There is a clear connection between feedback and language modification because negative feedback pushes the learner to change the language that he or she has used and positive feedback, such as confirmation or praise (Storch 2013, p.40), allows the learner to confirm the success of attempts at new language.

There is a notable difference between the type and frequency of feedback that students receive when they write collaboratively or independently. One of the major differences is that learners receive continuous peer feedback in real-time while they are completing collaborative writing while independent writers receive written feedback only after writing has been completed (Storch 2013, p.38, Ellis 2009, p.11). Perhaps what is more important about this feedback is not its immediacy, but that learners can receive feedback more frequently during collaborative writing. When learners complete this writing, they receive both immediate on-going oral feedback while writing with peers and delayed written feedback from teachers on the co-authored text. It is clear that completing collaborative writing allows writers to receive

feedback more frequently than individual writing and that the feedback they receive is more varied. Nassaji (2016) stresses that both immediate and delayed feedback can be useful depending on the learning context, learner and the type of feedback provided (p.551).

The feedback provided during collaborative writing is also in-line with the developmental stage of the learner given that it addresses the language problems that he or she is currently facing. Nassaji (2016) stresses that studies to date (e.g. Nakata 2014) have not revealed any clear differences between immediate and delayed feedback, but suggests that feedback has been shown to be beneficial if it targets language forms for which learners are developmentally ready and when it is based on the learners' on-going needs (p.554). The advantage of peer-feedback provided during collaborative writing is that it is in response to a language issue that the learner is currently facing thus salient, based upon his or her on-going needs and matched to the learner's developmental stage or scope of understanding. In simple terms, this type of feedback addresses a salient language problem as and when it is needed.

The importance of peer feedback is not only related to the use of language, but also to other aspects of writing, such as coherence. Berg (1999) stresses that peer feedback can help the writer focus on the meaning of ideas and highlight the differences between what the writer wants to say and what is understood. A peer can also offer suggestions for alternative ways of making meaning clear (p.220). Storch (2013) suggests that a peer provides a sounding board or ready-made audience that can verify or provide feedback on how well the writer's proposed message has been understood (p.42).

4.7.3 Language Related Episodes

Another important feature of interaction is that it allows learners to deliberate about the language that they use. Through such deliberation, defined as language related episodes (LREs) by Swain and Lapkin (1998), peers can discuss the language that they use. During collaborative writing, learners make proposals about the writing that they will complete and discuss many elements of this (see Storch 2005; Dobao 2012; Storch & Wigglesworth 2007; Wigglesworth & Storch, 2009; McDonough *et al*, 2016). Polio (2011) stresses that by observing students interacting about writing, we can gain insight into what they are focusing on (p. 149) and this is particularly true when observing and identifying the language related episodes that they engage in.

Through LREs learners discuss language use, explain or justify language choices, make proposals about language use, or ask for clarification about how language is used (Dobao, 2014, 2016). In this study, learners engaged in LREs associated with the use of grammar and vocabulary defined by Storch (2007, p.148) as form-focused (F-LREs) and lexical (L-LREs). Some of these episodes in the examples of collaborative writing dialogue analysed in this study are shown below.

Example 4. 3 - Example of a lexical language related episode (L-LRE)

S2 *Write*… not all designers and shops... choose to *what* …**display**?

S1 Choose to …**provide**?

S2 **Offer?** …*or* **display?**

S1 **Offer.** [From collaborative dialogue 81]

Example 4. 4 - Example of a form-focused, grammar-related, (F-LRE)

S1 … is that people who suffered…

S2 From obesity … have… **have** *or* **has** ?

S1 **Have**… [From collaborative dialogue 86]

Language related episodes do not only refer to deliberation about the use of grammar and lexis. Storch (2007, p.148) has also identified mechanical LREs (M-LREs) in which learners discuss punctuation and spelling and Fortune and Thorp (2001, p.149) have identified discourse-related LREs (D-LREs) specifically related to the organization and cohesion of written text. Examples of these LREs were also identified in this study. These are shown below.

Example 4. 5- Example of a mechanical (spelling) language related episode (M-LRE)

S2 *Yeah*…**behavior** and habit.

S1 No it's okay… **behavior** … **o-u-r**? … *or* **o-**r ?

S2 **I-o-r**… [From collaborative dialogue 90]

Example 4. 6 - Example of a discourse (organization) language related episode (D-LRE)

S2 Okay … start… can you **start with the first sentence**…there are many similarities…

S1 Go ahead **think of a topic sentence.**

S2 **The GCC countries are very similar** for example. [From collaborative dialogue 18]

Scholars have also suggested that collaborative writing is particularly suited to focusing on form because of the number of LREs students engage in while creating their co-authored text.

Niu (2009) noted that learners engaged in more LREs while completing collaborative writing activities than collaborative output speaking activities. Niu also noted that a written output task drew learner attention to language forms to a greater extent than an oral output task in that its performers focused on more language features relating to lexis, grammar, and discourse (p. 396).

While language related episodes seem to offer learners with optimal opportunities to learn about language and written discourse, it is worth noting that the success of these clearly depends upon the involvement and the relationship of the participants. Mackey (2014) stresses that social factors underlie the nature of learners' participation in interaction and therefore will logically impact learning opportunities through interaction (p.383). One of these factors is learner engagement. Each learner's cognitive, affective, and social engagement will clearly influence the LREs that both learners engage in (Svalberg 2009, p. 246-247; Svalberg 2012, p.378). If learners do not see the value of this activity, are not actively engaged, or have problems interacting with the person that they are working with, then this will logically have a negative effect upon the episodes that both learners engage in.

Also, while studies suggest language issues are generally resolved correctly when students engage in language related episodes, there also may be instances where students mis-correct each other, or provide the incorrect solution to a language issue that they face (e.g. Chen and Yu 2019, p.87; Pica, Lincoln-Porter, Paninos, & Linnell 1996, p.66; Jacobs 1989, p.72-74). An example of this is shown below.

Example 4. 7 - Example of an LRE resolved incorrectly

Hao What is the plural form for chef? Chefs? **Chefes**?

Chun I think **chefes** is correct.

Hao Are you sure?

Chun: Yes. (*from* Chen and Yu 2019, p.87)

Pica, Lincoln-Porter, Paninos, & Linnell, (1996) point out that in most cases learners call attention to each other's errors without mis-correction (p. 66) however, though relatively uncommon, there can be instances when this does occur.

4.7.4 Output and language modification

The processes that occur during the interactive collaborative writing process can prompt the learner to reconsider the language that he or she uses and lead to language modification. McDonough *et al* (2016) point out that the interactional adjustments that occur as learners work together can also facilitate L2 development (p.186). The opportunity to modify and reevaluate language, based upon the response of peers and the feedback they provide (often in real-time), creates a very different opportunity to learn to the one which they normally encounter in a teacher-fronted classroom (Philp, Adams & Iwashita 2014; Sato and Ballinger 2016).

Language modification may be prompted by noticing how language is used by peers and how this differs to the learner's own use of language. As learners engage in language related episodes, the information provided by peers may also prompt them to reassess the language that they use. Additionally, language modification may result from peer feedback that may push the learner to re-evaluate language use. As previously mentioned, there is a clear connection between feedback and language modification. While writing collaboratively, learners receive negative peer feedback that may push them to modify the language they have used in their proposal for the coauthored text, but may also receive positive peer confirmation to confirm the success of subsequent language modification or reformulation (Mackey and Gass 2014, p.183; Storch 2013, p.40). The importance of producing modified output is that it forces learners to reprocess their original output, often leading to syntactic processing and noticing at a deeper, more meaningful level (Swain, 2005). While output modification is not learning *per se*, it is a step in a gradual learning process (Adams, Nuevo and Egi 2011, p.58) which may lead to learning about how language is used.

4.8 Summary

Learning, seen from a sociocognitive perspective and by the interaction approach is viewed as an individual, cognitive process that is facilitated by interaction with others. The interaction that takes place during collaborative writing allows the individual learner to acquire knowledge about the target language and about how this language is used in writing. The opportunities to notice how language is used by peers, to receive feedback from them and to discuss language use provide a student with different opportunities to learn than those provided by independent writing.

5. Collaborative writing

5.1. The development of collaborative writing

This study assesses the use of collaborative writing in second language learning and examines its potential role as a writing to learn activity in EAP (Manchón 2011, p.3). However, collaborative writing has been studied in a range of different contexts and has developed from research into writing in both L1 and L2. The development of collaborative writing in L2 learning cannot be understood without recognizing the contribution of research in L1 relating to this interactive writing process.

Scholars investigating first language writing (L1) in the field of writing composition have looked at how students can learn together as they write, in a move toward a less teacher-centered pedagogy. More than four decades ago, Bruffee (1973) outlined how students could benefit from using collaborative writing in college composition courses. This scholar argued that during collaborative learning tasks students could learn **with** and **from** other students at the same time (p.640). Since then, Bruffee has gone on to publish a number of important articles in this field. In a similar way, other influential publications have been produced by scholars of L1 writing such as Ede and Lunsford (1990), Forman (1991, 2004), Beard and Rymer (1990), Bosley, Morgan, & Allen (1990), Higgins, Flower & Petraglia (1992), Keys (1994), Topping, Nixon, Sutherland and Yarrow (2000) and Duffy (2014). A number of these studies have also been cited by scholars of collaborative writing in L2 (see Kuiken and Vedder 2002a, p.171; Storch 2005, p. 154).

Collectively, the studies carried out by scholars into the use of collaborative writing in L1 and L2 have challenged the pervasive assumption highlighted by Ede and Lunsford (1990) that writing is inherently and necessarily a solitary and individual act (p.5). Perhaps, the difference between investigation into the use of collaborative writing in L1 and L2 relates to the use of this writing process to learn language. It may be assumed that within the context of writing in L1 that writers are fluent speakers of the language (Bruffee 1973, p.640), or at least that learning to use the grammatical structures and lexis of the target language is not the primary focus of this writing activity. However, the use of language while writing collaboratively has been the main focus of studies relating to writing in L2 (see section 5.4). Of particular interest, is the difference between independent writing and collaborative writing and how these two processes affect the complexity, accuracy and fluency of the writing produced (i.e. Storch

2005; Storch & Wigglesworth 2007; Wigglesworth & Storch 2009; Dobao 2012; McDonough, *et al* 2018; Villarreal and Gil-Sarratea 2019).

5.2 Collaborative writing in L2

Collaborative writing in second language learning (L2) primarily has been associated with using English as a second language however scholars have also examined the use of this writing procedure in relation to a number of different languages, such as French (e.g. Kowal and Swain 1994; Swain 1998; Swain and Lapkin 2001), Spanish (e.g. DiCamilla and Anton 1997; Lesser 2004; Dobao 2012), German (Malmqvist 2005; Eckerth 2008), Korean (Kim 2008; Kim and McDonough 2008) and other scholars, such as Kuiken and Vedder (2002a) have also looked at the effects of carrying out collaborative writing on a range of different languages, such as Dutch, English and Italian at the same time. Research into the use of collaborative writing in L2 has also looked at a range of learning environments and is not solely restricted to university settings, or to the EAP programs that are the focus of this study. For example, researchers such as Basterrechea and Mayo (2013), Calzada and García Mayo (2020) and Herder, Berenst, de Glopper and Koole (2020) have also looked at how collaborative writing can be used with young learners.

Within the range of different contexts in which collaborative writing in L2 has been examined, Zhang and Plonsky (2020, p.1-2) have identified two different strands of research. Firstly, **studies that have focused on the potential of collaborative writing for L2 learning**. These studies look at the learning opportunities that this writing process provides and whether carrying out this type of writing facilitates L2 performance or promotes the development of L2 writing proficiency. **The second strand has explored variables that may influence the potential of collaborative writing for L2 learning**, for example how learner traits such as proficiency level and attitude, or other factors including the relationships between peers may influence how students learn through this interactive writing process. Before outlining how students can possibly learn from completing collaborative writing and highlighting previous research related to this, I will briefly review studies relating to the second strand of research outlined by Zhang and Plonsky (2020), namely those that explored variables that may influence the learning potential of collaborative writing in L2.

5.3 Factors that may impact the learning potential of collaborative writing in L2

Learner attitude and engagement

A number of studies have focused on the learners' attitude towards collaborative writing, such as those carried out by Storch (2005), Shehadeh (2011), Dobao and Blum (2013) and Lin and Maarof (2013). While these scholars found that learners tended to have a positive attitude towards collaborative writing, others such as Chen and Yu (2019) have found that while students attitudes were generally positive, beliefs about the perceived value of peer assistance could either enhance or diminish students' positive attitudes towards collaborative writing (p.93). Learners' perceived beliefs about the benefits of collaborative writing may dictate how invested they are in this writing activity and this may possibly influence learning. For example, Storch (2008) found that learning in collaborative writing may depend on the learner's level of engagement in the language related episodes that take place while writing (p.110).

The relationship between peers

Researchers have also looked at the effect that the relationship between learners can have on collaborative writing; analyzing issues such as the pairing of students, the relationship between them and how these factors may affect how students interact and learn. Storch (2002) looked at the different patterns of interaction that pairs of students displayed while completing a series of collaborative writing tasks (i.e. composition, editing and task reconstruction). She identified four different patterns of interaction: collaborative, dominant/dominant, dominant/passive, and expert/novice. The different patterns described the degree to which each learner was engaged with each other's contribution and whether both learners contributed equally or had equal control over the task (p.127-129).

Researchers have also looked at how pairing learners by different proficiency levels affected the language related episodes that students engaged in as they completed collaborative writing activities. Lesser (2004) compared the LREs of pairs of students with different proficiency levels, e.g. high-high, high-low and low-low who completed a dictogloss writing task. He found that students with high L2 proficiency engaged in the largest number of LREs and resolved more of these correctly than mixed, or low proficiency pairs (p.68-70). However, Watanabe and Swain (2007) found that the different patterns of interaction (outlined by Storch 2002) had more of an effect on the number of LREs that students engaged in and on writing performance than differences in the proficiency levels of the learners; concluding that

differences in proficiency levels between pairs of learners did not necessarily affect the nature of peer assistance and L2 learning (p.137-138). Storch and Aldosari (2012) found that there was a greater focus on language use among high–high pairs than in high–low and low–low pairs of students, but suggested that both proficiency pairing and patterns of interaction needed to be taken into account. They also suggested that learners with similar L2 proficiency levels seemed to be more likely to form collaborative relationships than pairs where the proficiency gap was large (p.45-47). In addition to this, Mozaffari (2017) found that there was a difference between teacher-selected and self-selected pairs of students. Teacher-assigned pairs engaged in significantly more LREs than the student-selected pairs. The writing that teacher-selected pairs of students produced also had significantly higher ratings for accuracy and fluency than their counterparts. They also received a significantly higher rating for organization and use of grammar and vocabulary for assessment of writing quality (p.506- 509).

The choice of collaborative writing activity

Studies into the use of collaborative writing in L2 have looked at a number of different writing activities that are far removed from the essay writing that was completed in this study. Scholars have employed various collaborative writing activities, such as text reconstruction, jigsaw and dictogloss writing. Some of these studies have looked at how these different writing activities affect the frequency and type of LREs that students produce (e.g. García Mayo & Azkarai 2016) while others have compared individual and paired performance.

Dictogloss writing requires students to listen to a text that is read twice, individually take notes and then together they try to recreate the text; writing down their version of this. This writing activity has been used in a number of studies (e.g. Kowal and Swain 1994; Swain 1998; Kuiken, and Vedder 2002a, 2002b; Malmqvist 2005; Lesser 2004; Kim 2008; Calzada and García Mayo 2020). Another writing activity that differs to the essay writing that is completed in this study is **jigsaw** writing. This is an information gap writing task in which each participant has part of the necessary information and must exchange this in order to complete the writing task. One example is the activity carried out by De la Colina and García Mayo (2007) in which each student had different pictures of the steps to unload a ship. Once students agreed upon the correct order of the steps involved, they were required to write down a description of the whole process together (p.115-116). This activity has been used in a number of studies; sometimes in conjunction with other collaborative writing activities, e.g. Swain & Lapkin (2001), De la Colina & García Mayo (2007) and Storch & Aldosari (2012). **Text reconstruction** is a form-

focused activity where students have to insert words that are missing from the text, or change highlighted verbs in this so that they are conjugated correctly. This has been carried out in studies completed by Storch (1999, 2008) often in conjunction with other collaborative writing activities. Other writing activities such as dictation (e.g. Ammar & Hassan 2018) and task editing (e.g. Storch 2007; Nassaji & Tian 2010) have also been used to compare individual and paired performance. The different types of writing activities previously mentioned have been used extensively in the study of collaborative writing in L2, but the degree to which they can be compared to the essay writing analysed in this study clearly varies.

Mode of interaction

Another factor that may influence how students potentially learn from completing collaborative writing is the mode of interaction involved. The study that I have carried out focuses on face-to-face learning and the interaction that occurs as students work together which may allow them to learn about language use and about how writing is produced. However, other researchers have also looked at computer mediated collaborative writing which clearly alters the way learners interact and may possibly also affect how they learn. Computer mediated collaborative writing refers to collaborative writing that is conducted online in which learners jointly produce a single online text using a technology tool (Li 2018, p.2). This has been analysed in a number of studies carried out by Kessler (2009), Elola and Oskoz (2010), Kessler (2012), Bikowski and Boggs (2012), Strobl (2014), Yeh (2014), Wang (2015), Bikowski and Vithanage (2016), Li and Zhu (2017) and Hsu and Lo (2018).

Even though there seem to be differences in how students interact while completing computer mediated collaborative writing than while interacting face-to-face, a small number of studies have shown that completing computer mediated collaborative writing can have an impact on the individual writing that learners subsequently produce. Two of these studies were carried out by Bikowski and Vithanage (2016) and Hsu and Lo (2018). Both of these studies looked at how completing computer mediated collaborative writing affected the subsequent individual writing that students produced and how this compared to post-test changes in individual writing after completing writing independently. A comparison of the individual pre and post-test writing of students who had completed either computer-mediated collaborative writing, or independent writing revealed significantly greater increases in a number of measures in the individual writing of students from the computer-mediated collaborative writing group than in the same writing of students who wrote independently.

Using a 100-point analytic rubric which assessed the content, organization, academic style and grammar of the writing produced, Bikowski and Vithanage (2016) found that there was a significantly greater increase between the pre and post-test writing scores of students from the computer-mediated collaborative writing group than in the same writing of students from the independent writing group (p.86-87). The study carried out by Hsu and Lo (2018) revealed a less pronounced difference between both groups. They assessed the content and organization of writing produced (relating to writing quality) and complexity and accuracy (relating to linguistic competence). They found that there were significantly greater increases in accuracy, but no significant difference in measures of complexity. They also found the ratings associated with the content of writing produced increased to a significantly greater degree between the pre and post-test writing of students from the computer-mediated collaborative writing group than in the writing of students from the independent writing group, but there was not a significant difference between rating associated with organization (p.112-114).

While the previously mentioned studies point to the learning potential of computer-mediated collaborative writing, there may be notable differences between how students interact while completing face-to-face and computer mediated collaborative writing which in turn may affect how students potentially learn from these two activities; thus it is difficult to predict at this stage whether what students learn from computer-mediated interaction would be similar to what they learn from face-to-face interaction. Previous studies carried out have highlighted notable differences between computer mediated and face-to-face interaction (Rouhshad, Wigglesworth and Storch 2016, p.525-527) and others such as Cho (2017) have even found that there were differences in the frequency of interaction in computer mediated collaborative writing depending on whether text-chat, or voice-chat were used (p.47).

The previous studies have highlighted a number of areas that may have an impact on the learning potential of collaborative writing. The following section outlines the second strand of research into the use of collaborative writing in L2 identified by Zhang and Plonsky (2020, p.1-2); namely the potential of collaborative writing for L2 learning which is the focus of this research. In the next section I will look at the processes that occur during collaborative writing that may influence learning and review previous research that has assessed the learning potential of this interactive writing process.

5.4 How collaborative writing can facilitate learning

Collaborative writing and independent writing are two very different writing processes that may also provide students with very different opportunities to learn. Storch (2013) stresses that during collaborative writing, the thinking that is involved in producing a co-authored text, such as the linguistic choices involved in phrasing ideas, or decisions about how to organize these into a cohesive text, become external and explicit (p.18). Thus, ideas about how writing should be completed are brought out into the open to be analyzed and discussed. On the other hand, independent writing is generally an internal, introspective process which provides a student with different opportunities to learn. Some of the differences between these two writing processes are outlined in table 5.1 below.

Table 5.1 Processes that occur during collaborative and independent writing

Collaborative writing	**Independent writing**
Writing processes	
Both writers make proposals about the content of the co-authored text. They review these until they agree upon the final content.	The individual writer thinks about what should be included in the text and draws upon his/her knowledge to complete it.
Deliberation about language use and written discourse	
External (interpersonal) deliberation e.g. language related episodes with peers	**Internal** (intrapersonal) deliberation e.g. inner speech
Provision of new knowledge about language use and about written discourse	
Peer language input Peer proposals about the co-authored text	**None**
Feedback provided while writing	
Continuous real-time feedback	**None**
Opportunities for language modification provided by:	
Language related episodes Peer feedback Noticing	Inner speech

While writing collaboratively, both learners make proposals about the content of the coauthored text which are reviewed and discussed. The thinking that is involved in producing a text independently (which takes place in the mind of the learner) becomes external and explicit when two or more writers produce a coauthored text (Storch 2013, p.18). As a result, each learner's thoughts and understanding about how language should be used in writing and

how to organize ideas into a cohesive text are brought out into the open to be reviewed, questioned, critiqued, explained, or discussed (Storch 2019, p.146).

The externalized deliberation about all aspects of writing may provide each student with different opportunities to learn than those provided by independent writing. Deliberation about language use and written discourse also occurs in independent writing through what De Guerrero (2018) defines as the individual's inner speech, or the writer's internal, self-directed inaudible speech involved in thinking processes (p.2). However, this type of internal, introspective deliberation is clearly different to the deliberation that occurs between peers. Storch (2013) points out that while writing independently, the learner can only rely on his or her own linguistic resources and on the existing knowledge that he or she already has (p.37). Internal deliberation is therefore limited by what each individual learner knows. The self-contained nature of this introspective deliberation also means that there may be fewer opportunities for the learner to question, or re-evaluate the preconceived knowledge that he or she has, which differs considerably to what occurs during collaborative writing.

The externalized peer-to-peer deliberation about language use and written discourse provides the learner with opportunities to reevaluate his or her preconceived knowledge. This may be prompted by peer feedback about incorrect language use, by discussions about language and written discourse through LREs, or by noticing how language is used by a peer and comparing it to his or her own. The processes that stem from the externalized deliberation that occurs during collaborative writing may prompt the learner to re-evaluate and modify language use, or to learn about how language is used in writing. These are discussed in more detail in the following sections.

5.5 Interactive processes in collaborative writing that may facilitate learning

5.5.1 Producing co-authored text engages learners in different roles and activities

One of the most important differences between collaborative writing and independent writing is that writing is produced in a very different way. Storch (2013) stresses that when students complete collaborative writing tasks, learners suggest and counter-suggest ideas to be included in the co-authored text. They also deliberate about the language used to express these ideas, about how they should be arranged and discuss different ways to express them (p.42; p.156). Gutiérrez (2008) suggests that while writing collaboratively, learners engage in both implicit and explicit metalinguistic activities; these are activities in which the use of language is either

overtly discussed (i.e. explicit metalinguistic activities), or ones in which underlying attention to language can be inferred by the learners' actions (implicit metalinguistic activities). For example, students may either explicitly discuss how language can be used to express a particular idea, or may suggest and counter-suggest different ways to express the writers' intended meaning. The latter indicates that each learner has thought about the language used by his or her peer before counter-proposing an alternative even though language use is not explicitly discussed (p.521-522).

Collaborative writing also engages learners in different roles that are not normally adopted while completing independent writing and as a result this writing procedure requires them to carry out different functions which they rarely practice (Storch 2013, p.42-43). Storch suggests that while writing collaboratively learners can act as co-authors, as sounding boards, as critical peers and as tutors (p.42). This may provide students with different opportunities to learn about language use in writing and written discourse because learners engage in different functions while fulfilling these roles. This may include explaining, providing feedback, inviting opinions, or expressing disagreement with peers which Storch (2013) stresses are functions that are rarely carried out in a teacher-fronted class (p.43) and also are not an integral part of independent writing. The deliberation that takes place between peers while they are engaged in these activities also provides opportunities for students to learn while they are writing.

5.5.2 The importance of external deliberation

Storch (2013) stresses that during collaborative writing, deliberation about the creation of the co-authored text becomes external and explicit (p.18). Ideas about language use and the content and organization of the written text are brought out into the open to be analyzed, reviewed, and discussed. A learner can notice how language is used by his or her peer, discuss its use and at the same time receive continuous feedback about language use from this peer (Storch 2013, p.151).

Externalizing deliberation means that learners talk about writing. Storch (2013) points out that studies that have investigated the nature of learner talk during collaborative writing activities show evidence that they are replete with occasions for second language learning (p.156). The fact that this external deliberation clearly involves another person is also important because he or she is not only a source of new information, but also provides another point of view about language use or written discourse and may challenge or question the preconceived ideas that

the learner has. Internal (intrapersonal) deliberation, or inner speech that occurs during independent writing, may also prompt the learner to reconsider language use to a certain degree, but does not provide the learner with a possibly divergent opinion while they are writing nor peer input which the learner can compare his or her use of language to. Both of these facets may prompt the learner to re-evaluate the language that he or she uses. This process is illustrated in the following example of collaborative dialogue of two students who were completing collaborative writing in this study:

Example 5. 1 – Example of a language related episode

S2 Lack of **sports** *for instance*…

S1 It is lack of **exercise**.

S2 *No, I mean* football basketball.

S1 Not **playing sports.**

S2 *What is called?*…. **Not practicing hobbies.**

S1 *What* ?

S2 Hobbies… *no, it can be* reading…

S1 *Write*… **not practicing any kind of sports.** [From collaborative dialogue 2]

In this example, S1 notices how her peer S2 proposes the incorrect expression "**lack of sports**" and counter proposes "**lack of exercise**" which is correct, but not fully accepted by her partner. Deliberation continues until both learners agree upon "**not practicing any kind of sports"** which is the exact idea S1 wishes to convey. The importance of this is that the learner's attention is drawn to the incorrect use of "**lack of sports**" by her peer and the deliberation that follows reveals acceptable ways in which the intended idea can be expressed. If student S1 had completed writing individually, what would have prompted her to reconsider the use of "**lack of sports**"**,** or possibly highlight the fact that this expression was incorrect?

5.5.3 Provision of new knowledge about language use and about written discourse

When a learner completes independent writing, he or she can only rely on the existing linguistic resources or knowledge that he or she already has (Storch 2013, p.37). However, peers provide the learner with an additional source of information about language use and written discourse (Storch 2013, p.43). The provision of this additional source of information allows the learner to acquire new knowledge about language use in writing and about the creation of written discourse in a number of different ways.

Firstly, a peer provides the learner with language input while completing a collaborative writing task. When a partner makes proposals about ideas to be included in the co-authored text, the learner has the opportunity to notice how a new language structure is used by this person and to add this to his or her own language repertoire (e.g. Storch 2005, p.167). The importance of this is that a learner is provided with additional input during collaborative writing that an independent writer does not receive. Moreover, the learner-like input that peers provide is interactionally modified or suited to the learner's level of understanding (Mackey, Abbuhl, & Gass 2012, p.8).

In addition to this, deliberation about language use through LREs also allows the learner to acquire L2 metalinguistic knowledge; defined by Roehr & Gánem-Gutiérrez (2009) as a learner's explicit knowledge about the syntactic, morphological, lexical, phonological, and pragmatic features of the second language (p.165-166). This involves a learner's understanding of the "rules" that govern language and is reflected by the learner's ability to correct, describe, and explain L2 errors (Roehr 2008, p.173). Herder, Berenst, de Glopper, & Koole, (2020) stress that collaborative writing also provides learners with a context to share knowledge with their peers (p.14). This can be seen in the previous example of an LRE (see example 5.1) where S1 provides S2 with a number of different expressions that can be used, e.g. **lack of exercise, not playing sports** instead of the incorrect expression **lack of sports** that S2 originally used.

5.5.4 Feedback

During independent writing, a learner does not receive the continuous, real-time feedback that a peer may provide during collaborative writing. However, during collaborative writing, feedback is provided continuously, in-real time (Storch 2005, p. 168) and this means that learners can receive feedback related to errors in language use as and when they occur. Negative feedback, such as indications by peers that the learner's attempt has not been fully understood, may prompt this student to reevaluate the language that he or she has used. When learners make attempts to address these mistakes and make a new proposal about language use, they can also receive feedback to confirm the success of this attempt, or further indications that it has not been understood. This feedback creates an opportunity for learners to modify the language that they use.

Collaborative writing also multiplies the feedback that the learner receives while writing. Collaborative L2 writers receive immediate peer feedback during the writing process and at

the same time receive delayed written feedback on their completed writing in the same way that independent writers do. The importance of this is that collaborative writers not only receive more feedback, but also that it is more varied (e.g. immediate/delayed, oral/written, peer/instructor). Manchón (2014) suggests that different types of feedback, or feedback provided at different points of the composing process may serve different functions (p.30) which in turn may possibly provide different opportunities to learn.

5.5.5 Opportunities for language modification

McDonough *et al* (2016) also point out that collaborative writing elicits communication between students, and this creates opportunities for interactional adjustments, such as language modification to occur (p.186). The language related episodes (LREs) that learners engage in, the feedback provided by peers, and the possibility for students to notice how language is used by their partners and compare this to their own use of language provide learners with opportunities to reassess and modify language use. Learners discuss the use of language while writing collaboratively through LREs which may prompt them to reconsider and change the language that they use. Examples of this have been provided by different studies into the use of collaborative writing in L2 (e.g. Storch & Wigglesworth 2007, p.162; Wigglesworth & Storch 2009, p.457; Basterrechea and Mayo, 2013, p.35). Learners also receive feedback from peers that may highlight errors in language use, or confirm the success of a subsequent new language attempt as learners modify the language that they use in response to the corrective feedback provided by peers. Both of these facets can be seen in an example of collaborative dialogue below.

Example 5. 2 An example of peer-prompted language modification

S1 *What did you write?*

S2 They don't move a lot to burn the **fats** and calories.

S1 **Fat** *without* s.

S2 *Correct.*

S1 They don't move a lot…

S2 To burn the **fat** and calories .

S1 ***That's it***... [From collaborative dialogue 2]

Collaborative writing also provides learners with an additional opportunity to notice how language is used. The new expressions proposed by peers during collaborative writing can be

used by learners in their own subsequent individual writing. A learner may also notice how his or her own language output differs to feedback provided by peers, which may prompt the learner to reevaluate and modify language use (Adams 2003, p.348). The combination of all of the factors previously mentioned means that collaborative writing potentially provides the learner with more opportunities to reconsider and modify language use than individual writing does.

5.6 Research into collaborative writing and learning in L2

While collaborative writing may provide students with different opportunities to learn than those provided by independent writing, the possible learning benefits of this writing process in L2 learning have yet to be fully explored and assessed; a point highlighted by a number of researchers in this field (e.g. Storch 2005; Dobao 2012; Wigglesworth & Storch, 2009). Storch & Wigglesworth (2007) have mentioned that while collaborative writing provides, "opportunities for language learning and consolidation" (p. 172), these scholars have not looked at what individual students learn from completing collaborative writing.

To date, studies into the use of collaborative writing in L2 have looked at three areas related to learning. Firstly, the majority of studies have looked at how the writing that is produced collaboratively (in pairs, or groups) compares to writing that individuals produce (e.g. Storch, 2005; Dobao, 2012; Storch & Wigglesworth, 2007; Wigglesworth & Storch, 2009). A limited number of studies have looked at writing performance before and after collaborative (or independent) writing has been carried out (e.g. Shehadeh 2011, Khatib and Meihami 2015, Yazdi-Amirkhiz, Ajideh & Leitner 2016). Other studies have also looked at the language related episodes that take place while students complete collaborative writing (Storch 2005; Dobao 2012; Storch & Wigglesworth 2007; Wigglesworth & Storch, 2009; McDonough *et al*, 2016), or during other related collaborative activities associated with writing, such as text reconstruction (Nui 2009; Malmqvist 2005; Basterrechea and Mayo 2013; De La Colina and Garcia Mayo 2007; Fortune and Thorp 2001) and text editing (Storch 2007; Hanjani and Li 2014).

Storch (2011) stresses that the number of empirical studies that have investigated collaborative writing in L2 classes is relatively small and that there are a limited number of studies showing evidence of L2 learning (p.277, p. 282). With this in mind, I will also review other L2 studies that have focused on collaboration and learning, but not on collaborative writing *per se*, which

can also provide information about how collaboration and peer interaction could possibly facilitate individual learning.

5.6.1 Studies comparing writing completed independently or collaboratively

Several studies have focused on how writing completed by pairs or groups of students compared to that of individual writers (Storch, 2005; Dobao, 2012; Storch & Wigglesworth, 2007; Wigglesworth & Storch, 2009). These studies have also looked at the interaction between students while they completed collaborative writing with a view to explain the possible differences between grouped and individual writing. In all cases, there is evidence of language negotiation (Long 1996); that is learners modifying the language they use in response to feedback from peers, and of learners engaging in LREs (Swain and Lapkin, 1998) when deliberating about the language they would use to complete the collaborative piece of writing.

These studies also revealed certain differences between writing completed by individuals and writing completed by pairs of students, and in the case of Dobao (2012) between individuals, pairs, and groups. The study completed by Storch (2005) found that pairs of students produced texts that were more accurate and linguistically complex, but were more succinct than those produced by individual students. Storch & Wigglesworth (2007) and Wigglesworth & Storch (2009) found that there were higher levels of accuracy in the writing produced by pairs of students than by individuals, but no significant difference in terms of complexity and fluency. Similarly, Dobao (2012) found that writing that was produced by groups was more accurate than writing produced by pairs, and that paired writing was more accurate than individual writing.

More recently, a number of studies have compared writing completed collaboratively or independently in slightly different ways to those seen in studies carried out by the aforementioned scholars but have reported similar findings. McDonough *et al* (2018), examined the writing of three groups of students (n=128) who had either completed collaborative writing (n=66), independent writing (n=30), or students who had worked collaboratively during the prewriting stage (related to idea generation and planning), but who had completed writing individually. These were referred to as collaborative prewriting students in this research (n=32). The objective of this study was to see whether collaboration completed in the pre-writing stage also had an effect on the writing produced even when this was produced individually.

Like the previously mentioned studies, these scholars found that the collaborative writing group who had worked together through all stages of the writing process produced writing that was more accurate than that produced by independent, or collaborative prewriting students. As in previous studies, the study carried out by McDonough, De Vleeschauwer & Crawford (2018) also did not identify significant differences between measures of fluency for the writing samples of the three groups although they did find independent and collaborative prewriting texts had significantly higher rates of subordination than collaborative writing texts suggesting that they were more linguistically complex. McDonough *et al* (2018) suggest that the benefits of collaboration for accuracy may only occur during the process of writing and not during the planning, or brain storming stage prior to writing (p.116). This reflects the results of another study carried out by Neumann and McDonough (2015) that found that student collaboration during the pre-writing stage did not seem to have a clear impact on the quality of students' subsequent individual writing (p.99).

In a short-term, three-week study, Villarreal and Gil-Sarratea (2019) compared the writing completed by two groups of students (n=32); one who completed a writing task collaboratively (n=16) and the other who completed the same task individually (n=16). The only difference to the studies previously described (e.g. Storch *et al*) was that students from both groups all completed an individual pre-test writing task to establish their baseline competence just before either the independent, or collaborative writing was carried out. Like studies completed by Storch (2005); Storch and Wigglesworth (2007); Wigglesworth and Storch (2009) and Dobao (2012), writing produced collaboratively was more accurate than texts produced independently in the collaborative texts (with a higher number of error-free clauses and T-units), but there were no notable differences between collaborative and independent texts in terms of complexity and fluency (p.14-18).

What conclusions can we draw from these studies in relation to learning?

The common pattern that is highlighted by the studies previously outlined is that writing that is produced collaboratively tends to be more accurate than individual writing, but that in most cases there are no differences in terms of the complexity and the fluency of the writing produced. However, from the results of these studies, we cannot be sure that the individual students have learned about accurate use of language in writing from the process of writing collaboratively, nor that each learner would be able to apply what was learned from completing collaborative writing to their own work. It is indeed **possible** that the students involved in the

previously mentioned studies have learned about accurate language use and that they could apply this knowledge to their own individual work, but from the results of these studies, we still cannot draw any conclusions related to individual learning.

5.6.2 Studies comparing writing before and after collaboration

There are a limited number of studies that look at writing completed before and after collaborative writing has been carried out. From these studies, we can assess how the learner's writing changes as a result of completing either collaborative, or independent writing to gauge what individual students learn from completing either of these two writing procedures. To my knowledge, only two studies have looked at how individual writing changes after completing collaborative writing and how this compares to changes noted after writing independently in a physical learning environment, namely those completed by Shehadeh (2011) and Khatib and Meihami (2015) although a limited number of other studies have also compared the effects of completing computer mediated collaborative writing and independent writing on individual writing (e.g. Bikowski and Vithanage 2016; Hsu and Lo 2018). A third study carried out by Yazdi-Amirkhiz, Ajideh & Leitner (2016) assessed how individual writing periodically changed after completing five cycles of three consecutive collaborative writing sessions, followed by the completion of an individual writing task (p.8), but did not employ a pre and post-test design.

The first study carried out by Shehadeh (2011) employed a pre and post-test design and compared the pre and post-test performance of two groups of students who had completed the same series of writing tasks either independently or collaboratively (n=38). The study revealed notable improvement in the content, organization and vocabulary between the pre-test and post-test writing samples of the collaborative group when compared to those of students who had completed the same tasks individually. However, there were no significant differences noted in terms of grammar and mechanics of writing. One possible explanation for the lack of evidence of improvement in the use of grammar provided by Shehadeh (2011) was due to the low proficiency level of the students taking part in the study (average 3.5–4.0 IELTS score) and their inability to effectively discuss the use of grammar with their peers. Another possible explanation is that this study also employed a holistic measure of overall writing quality (Hedgcock and Lefkowitz, 1992) to assess changes between pre and post-test writing samples. Polio (2001) stresses that choosing the most appropriate measure is crucial (p.93) and it is possible that the use of holistic measures may not have highlighted more fine-grained changes

in the use of grammar. This scholar suggests that holistic measures may not be suitable to assess the writing of homogeneous populations, or changes in the writing of students from the same group (Polio 1997, p.130).

A similar pre and post-test design study (n=35) was conducted by Khatib and Meihami (2015). This looked at the effect of carrying out collaborative and independent writing on the individual writing performance of two groups of low-intermediate EFL students ranging between 15 to 18 years of age. Students from both groups completed an independent pre-test writing activity which was compared to a similar post-test writing activity completed after writing had been carried out collaboratively (by the experimental group), or independently (by the control group) over a period of 6 weeks. The pre and post-test writing samples of both groups were rated using the same rating scale employed in the study carried out by Shehadeh (2011) to assess the content, organization, grammar, vocabulary, and mechanics of writing produced. While there were no significant differences between the ratings for these five components in the pre-test writing of both groups, scores for these were notably higher for the post-test writing of the experimental collaborative writing group than the control group who completed independent writing and an independent samples t-test revealed that there was a significant difference between the post-test scores of both groups (p.206-208).

The final small-scale study (n=8) carried out by Yazdi-Amirkhiz, Ajideh & Leitner (2016) looked at how individual writing changed after completing collaborative writing. Students carried out three consecutive collaborative writing sessions, followed by the completion of one individual writing task (p.8). This process was repeated five times to produce five individual writing samples for each student: each taken after completing three consecutive collaborative writing sessions. The five independent writing samples periodically produced by each learner after the completion of five writing cycles showed minimal changes in the global assessment of the writing produced. However, this study employed holistic assessment of writing using the IELTS rating-scale descriptor (Public version) which identifies global qualitative changes in written performance and not measures of linguistic competence, such as complexity, accuracy, and fluency (Wolfe-Quintero, Inagaki and Kim, 1998) that may have identified changes in language use.

What conclusions can we draw from these studies in relation to learning?

From this limited number of studies, we have seen that there were greater increases in a number of measures in the individual writing of students who completed collaborative writing than in the same writing of students who completed independent writing in the studies carried out by Shehadeh (2011) and Khatib and Meihami (2015), but there were no notable changes in individual writing after completing a series of collaborative writing activities in the small-scale study carried out by Yazdi-Amirkhiz, Ajideh & Leitner (2016). These studies employed holistic rating scales, assessing the content, organization and grammar and vocabulary used, and not the more finely tuned measures of complexity, accuracy and fluency like the studies carried out by Storch & Wigglesworth (2007), Wigglesworth & Storch (2009) and Dobao (2012). From the extremely limited number of studies that look at how writing changes as a result of carrying out either collaborative or independent writing, it is difficult to draw any conclusions on the learning potential of collaborative writing in relation to individual learning other than that further research needs to be carried out.

5.6.3 Studies that identify language related episodes in collaborative writing and collaborative tasks

A number of studies have looked at the Language Related Episodes (LREs) that take place while students complete collaborative writing (e.g. Storch 2005; Dobao 2012; Storch & Wigglesworth 2007; Wigglesworth & Storch, 2009; McDonough *et al*, 2016), or other related collaborative activities such as text reconstruction (e.g. Fortune and Thorp 2001; Malmqvist 2005; De La Colina and Garcia Mayo 2007; Nui 2009; Basterrechea and Mayo 2013) and text editing (e.g. Storch 2007; Hanjani and Li 2014). While completing collaborative writing, learners discuss how language is used through language related episodes and this process may prompt individual learners to change or reconsider language use. This process has been identified in a number of different studies. Two examples are shown below.

74 Julie: Exam **is** necessary but not ... the only
75 Ann: Exams **are** necessary?
76 Julie: yeah
77 Ann: **are** necessary in education... *(from Wigglesworth and Storch, 2009 p.457)*

Dan: As seen on the graph.
Sam: has the **most** average, **most** average.

Dan: you mean the **highest**.

Sam: Yes, the **highest**. The **highest** average rainfall

(from Storch and Wigglesworth, 2007, p.162)

The previous examples show how the LREs that occur during collaborative writing can lead to language modification. Adams, Nuevo & Egi (2011, p.58) mention that language modification is, "…a step in a gradual learning process", so while output modification that occurs during LREs is not learning *per se*, it is a tentative first step towards a new language structure which may lead to subsequent learning. The importance of this is that these LREs occur during collaborative writing while during independent writing they do not.

Researchers such as Storch and Wigglesworth (2007), Wigglesworth and Storch (2009) and Dobao (2012) have found that L2 learners who completed collaborative writing engaged in language related episodes about the use of grammar through form-focused F-LREs, about the use of lexis through lexical L-LREs and about spelling and punctuation through mechanical M-LREs. Others such as Storch (2005) and Fortune and Thorp (2001) have also found that learners engaged in discourse-related D-LREs about the organization and cohesion of the text that they produce. The LREs that students engage in while writing collaboratively provide them with opportunities to learn about language use in writing and about the organization and arrangement of ideas in text that are not provided by independent writing. However, it cannot be said that all students learn from these equally. For example, Storch (2008) found instances where LREs led to consolidation of the language issue discussed for one learner, but not the other, or for both learners or neither one (p.109). This scholar found that learning depended on the learner's level of engagement, so while LREs provide the opportunity for learning to occur, they do not necessarily lead to learning in all cases.

5.6.4 Studies comparing collaborative and individual performance of other writing-related tasks

While the previously mentioned studies have highlighted notable differences in the writing that was completed by pairs and groups of students to that of individuals, other studies that have assessed writing-related tasks, such as text editing, have been less clear. For example, when analyzing individual and paired performance of a text editing task, Storch (2007) found that there were no significant differences between the accuracy of tasks completed individually and those completed by pairs (p.155). Similarly, Kuiken and Vedder (2002b) found no significant

differences between how individuals and small groups of students performed a dictogloss writing task. Before completing dictogloss writing, students completed a test of their knowledge of passive structures (pre-test) which were embedded in the text that they would see. This was followed by a similar post-test and delayed post-test after the dictogloss task had been completed. These scholars also found that there were no significant differences between the post-test and delayed post-test performance of students who had completed the dictogloss writing activity individually to those who had worked in small groups (p.348-350).

On the other hand, Nassaji and Tian (2010) found that when learners carried out a reconstruction cloze task and an editing task collaboratively, they were more successful at completing the tasks than when they carried them out individually (p.411). Similarly, Storch (1999, p.366-370) found a difference between how students who worked individually or in pairs performed a cloze exercise, text reconstruction task and completed a writing composition although the significance of this difference was not assessed possibly due to the limited number of students who took part (n=8). Malmqvist (2005) also found that when completing dictogloss tasks, texts that were produced collaboratively were not only longer and more detailed, but also syntactically more complex than the ones that were produced individually (p.139).

Another study carried out by Kim (2008) found that students who completed a series of collaborative tasks scored higher on the vocabulary knowledge scale (VKS) related to the lexis that they had used in individual immediate and delayed post-tests than those students who had completed the same tasks individually (p.124). However, Nassaji and Tian (2010) found that while learners were more successful at completing tasks collaboratively than when they carried them out individually, the comparison of the learners' pretest and post-test scores showed no significant difference between the collaborative and the individual tasks in terms of their effect on learning specific structures such as phrasal verbs (p.411).

Taken together, the previous studies suggest that performance may be improved by collaborative effort, but that the potential for individual learning resulting from collaboration still remains unclear. Further investigation is needed to see if individual students actually learn from collaboration, and if so to establish what they learn from it. In the case of collaborative writing, it is possible that improved collaborative performance may also result in improvement in the participants' own individual writing and that individuals can learn from the process of working together and writing with their peers. The aim of this study is to explore these possibilities.

5.7 Summary

In the previous sections, we have seen that collaborative writing provides students with different opportunities to learn about language use in writing and about written discourse than independent writing. Through collaborative writing, ideas about language use and about written discourse are brought out into the open to be reviewed, debated and discussed and it is possible that this externalized deliberation about different aspects of writing may potentially allow students to learn from their peers while they write. There are also a number of interactive processes that occur during collaborative writing that have the potential to facilitate language learning and help students learn about written discourse. Collaborative writing allows learners to notice how language is used by peers, to receive continuous, real-time feedback related to their own language use and to deliberate about language. Learners must also agree upon how ideas are presented, organized and arranged in the final co-authored text which provides them with an opportunity to learn about written discourse. Collaborative writing in L2 may provide learners with different learning opportunities than individual writing. However, to date only a limited number of studies have explored the learning potential of this writing process and fewer still have looked at what individual students learn from completing collaborative writing. This research will attempt to address this gap.

6. Methods

6.1 The research context

The aim of this study is to look at how the individual writing of students in an English for Academic Purposes Program **(EAP)** changes after completing either collaborative or independent writing under the same conditions and over the same period of time. Through such analysis, it may be possible to gauge the learning potential of collaborative writing by comparing how individual writing changes over time (between pre and post-test writing) after completing this interactive writing procedure to how individual writing changes after completing the independent writing that is commonly carried out in EAP (Bhowmik, Hilman & Roy 2019, p.2).

6.2 An overview of the study carried out

To explore this possibility, I looked at individual student writing completed before (pre-test) and after (post-test) a series of collaborative writing activities had been carried out and compared this to the individual pre and post-test writing of students who completed the same series of writing tasks independently (under the same conditions and over the same period of time). This study was therefore composed of three different stages:

Stage 1 – The collection of a pre-test writing sample from the individual students assigned to the collaborative or independent writing groups

Stage 2 – When students from both groups completed a series of writing tasks either collaboratively (collaborative writing group), or independently (independent writing group) over an extended period of time (8 weeks)

Stage 3 – The collection of an individual post-test writing sample from students assigned to the collaborative or independent writing groups

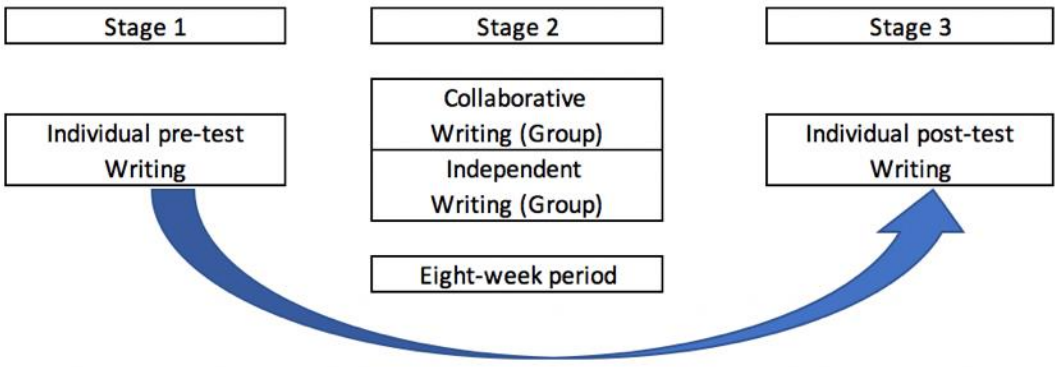

Figure 6.1 Research study stages

In this study, the pre and post-test writing of each student was analyzed and compared to gauge possible changes in individual writing performance after completing either collaborative or independent writing. Because this study looks at changes in individual writing that may result from completing these two writing processes and not at writing completed collaboratively, the writing produced by pairs of students in this study was not assessed.

6.3 Research questions

To date, collaborative writing is still relatively uncommon in most L2 classrooms (Storch, 2011) perhaps because as Dobao (2012) points out, the potential learning benefits of this writing procedure have yet to be fully explored and assessed. Most of the limited number of studies related to collaborative writing in L2 have focused on how writing produced collaboratively by pairs, or groups of students differs to writing produced by individuals and not on how the individual learner's own writing is affected by carrying out collaborative writing, or on what this student can learn **from** writing collaboratively (e.g. Storch 2005; Dobao 2012; Storch and Wigglesworth 2007; Wigglesworth and Storch 2009). To assess the impact of collaborative writing on the student's individual writing and what he or she may possibly learn from completing collaborative writing, I will address the following research questions:

1. How do accuracy, fluency and complexity change in individual writing after carrying out collaborative writing in a 10-week English for Academic Purposes course and how does this differ to how they change in the individual writing of students who completed independent writing over the same period of time?

2. Does carrying out collaborative writing affect the coherence and cohesion of individual writing that is subsequently produced and how does this differ to differences noted in the coherence and cohesion of individual writing produced after writing independently?

3. To what extent do learners engage in language related episodes associated with learning about language and written discourse while completing collaborative writing?

6.4 Research Design

This is a quasi-experimental classroom-based study (n=128) that employed a quantitative approach to answer the research questions previously outlined. This study followed a non-equivalent (pre-test and post-test) control-group design (Creswell, 2009) that involved two groups of students; referred to as the collaborative and independent writing groups. Students from both groups completed an individual pre-test writing activity to establish the baseline linguistic and discourse competence of each writer (stage 1). Afterwards, students assigned to the collaborative writing groups completed a series of writing tasks collaboratively while students assigned to the independent writing groups completed the same series of writing tasks independently. During this stage, students who completed collaborative writing were recorded to analyze language related episodes in their transcribed collaborative dialogue (stage 2). At the end of an eight-week period, students from both groups completed an individual post-test writing activity (stage 3).

6.5 Balancing internal and ecological validity

Polio (2017) stresses that tightly controlled studies may run the risk of lacking ecological validity (p.263). When designing this study, I tried to isolate the effects of each type of writing (treatment) on the individual writing produced by students over time (between the pre and post-test writing stages) and at the same time analyze these effects in a specific real-world educational context. Polio and Friedman (2016) mention that one of the challenges of carrying out classroom-based experimental studies is balancing moves to ensure internal validity (that the effects are really due to what is being studied, e.g. collaborative or independent writing) while maintaining the ecological validity of the research or authenticity of the activity being carried out (p.19-20). I was able to minimize possible differences between both groups that could have had an unexpected effect on the dependent variables, or characteristics of the individual writing produced without changing how instruction was normally carried out. Essentially no changes were made to any part of the EAP program to accommodate this study other than some students completing collaborative writing instead of writing independently. The minimizing of possible differences was facilitated by the similarity of the participants and the nature of the EAP program itself. All participants received the same instruction in this EAP program, completed the same series of classes (other than EAP) in the preparatory year course that they completed and had a very similar level of English proficiency (see **6.6 Participants**). Students also could not choose their class group and were randomly assigned to a particular

section. I was able to isolate the effects of completing collaborative or independent writing over time without changing any of the writing activities that were commonly carried out in class and with minimal changes to how each class was normally taught (see **6.7 Classroom setting and instruction**). The only noticeable difference between both groups was whether collaborative or independent writing was carried out.

6.6 Participants

The participants in this study were selected because of the high degree of similarity between them. They were all students in a university in the United Arab Emirates where English is the medium of instruction. They were all completing the same preparatory year course for entry into the various degree programs that they would select and studied the same series of subjects, e.g. English for Academic Purposes, advanced mathematics, global studies, study skills and Arabic language. The participants in this study were all Arabic first language speakers, female, of a similar age (19-21) and had very similar levels of spoken and written English (IELTS 6.0-6.5). The fact that students who took part in this study were from the same country and only included female students could be seen as a moderator variable that could potentially modify the relationship between the independent and dependent variables (Mackey and Gass 2015, p.155). On the other hand, other aspects such as the educational level of the participants, their level of English proficiency and reasons for completing the EAP course may be largely representative of other students who complete similar EAP programs.

6.7 Classroom setting and instruction

As previously mentioned, no changes were made to accommodate both writing procedures. Students carried out the same series of writing activities as those completed in previous EAP courses (see **Writing activities**). The structure of a normal class also did not change. As can be seen in figure 6.2 below, a typical class involved a 20-minute period of instruction, followed by a 50-minute writing activity and finally a 10-minute review of the work completed. Information about each of the phases in a typical lesson are also outlined overleaf.

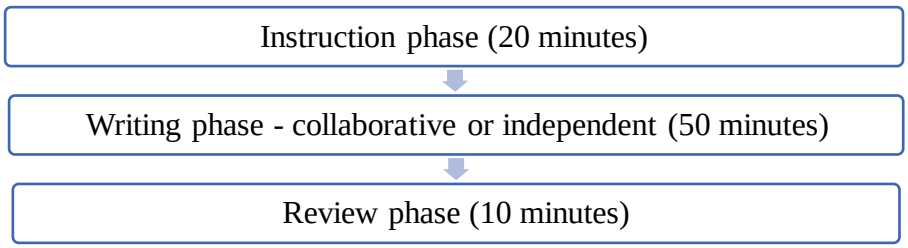

Figure 6. 2 Classroom procedure

Instruction phase

During the 20-minute instruction phase, the specific writing that students needed to complete was presented. For example, if learners were going to write an expository essay, an example of this would be presented and the instructor would explain how to organize and present each type of writing. Typically, 2-4 classes would be spent on each type of writing, so after the introduction and explanation in the first class, the following instruction would focus on the salient features of each text, such as the inclusion and positioning of thesis statements and topic sentences in each type of writing. The focus of instruction was on composing and not on the use of language in writing. Unless specific questions were asked, instruction did not deal with the use of grammar and lexis, or any other aspect of language use.

Writing phase

In the 50-minute writing phase, students were instructed to complete the task, but not on how they should complete it. The only intervention on the part of the instructor was to remind students that they should have started writing after 15 minutes had elapsed and a further reminder to finish writing when there were 5 minutes left to complete the task. For writing activities that required preparation, such as summary writing, students would spend the first 15 minutes preparing notes before starting to write, for other types of writing, such as essays, generally less time would be used to generate ideas before writing, or students would think of ideas to be included while they were actually writing.

Students from both groups did not tend to ask the instructor questions. This meant that the writing phase was generally silent in class groups where independent writing was completed. Classes where collaborative writing was carried out were noisy due to the continuous discussions between learners as they completed writing. Students from both groups were able to use a paper dictionary, but were not encouraged to search for information using computers or phones. Learners who completed collaborative writing worked in pairs. They were allowed to choose their own partner and as they tended to sit in the same seat for every class, they generally worked with the same partner throughout. However, when one student was absent, the other would join a pair of other students to make a trio, or make another pair if another student's partner was also absent. Both of these scenarios, especially the latter, were quite infrequent due to the strict attendance policy of the course.

Scholars such as Wigglesworth and Storch (2009) have suggested that collaborative writing generally takes more time to complete (p.449), but in this study there was no noticeable difference in time taken to complete each task and in general terms writers from both groups finished writing slightly before the time was up.

Review phase

The last 10 minutes of the class was spent answering questions about the writing activity, reviewing the teaching points covered and explaining the work to be completed in the following class. This was also used to answer questions about previously completed work.

Writing activities

The types of writing activities carried out in this study were the same as previous courses. This related to the specific writing activity and the genre of writing that they completed. Students completed two types of writing, either a summary of a text and a short response addressing an issue discussed in this, or an essay related to this topic. The types of writing were related to the following genres, descriptive or expository writing, cause and effect and compare and contrast writing. The timetable of writing activities is shown in figure 6.3 below.

Stage	Week	Class	Activities
Stage 1	Week 1	Class 1	Introduction
		Class 2	**Pre-test writing task**
Stage 2	Weeks 2-3	Classes 3-6	Descriptive writing tasks
	Weeks 4-6	Classes 7-12	Cause and effect writing tasks
	Weeks 7-9	Classes 13-18	Compare and contrast writing tasks
Stage 3	Week 10	Class 19	**Post-test writing task**
		Class 20	Review

Figure 6. 3 Timetable of writing activities

Each writing activity was completed in one class and submitted to receive written feedback in the following lesson. Both students who completed collaborative writing received a copy of the original script they had completed which contained the same written feedback. Students who wrote individually received a copy of their work with the same type of feedback as their peers.

6.8 Grouping

Students from eight intact class groups were chosen to take part in this study. In one semester four intact class groups took part; in the following semester four additional groups were included. Of the four class groups chosen in each semester, two were randomly chosen to be groups that completed collaborative writing and the others completed writing independently. Polio and Friedman (2016) stress that when participants are chosen from intact class groups that student selection into a particular class could be a factor in their learning. For example, students who choose a morning class could be more motivated to learn (p.21). However, students in the university preparatory program were randomly allocated to a particular class group (section) with a fixed class schedule; meaning that they could not choose which class they completed on a particular day or time and had to follow the same schedule as their peers.

6.8.1 Number of participants and group size

It was difficult to predict the number of participants who would take part in this study. I predicted that the number of students that registered for each class would not be the same as those whose data would be included in this research because students had to give consent for this to be used. To analyze and compare pre and post-test writing, students also had to be present on the days when the pre and post-test writing activities were completed for their data to be used. The number of students who were initially registered and whose data was used can be seen in figure 6.4 below. At the end of the study, the data of 128 students (n=128) was used. While the average number of students was approximately 16 students per class, in reality the data taken for each class group was uneven (shown below) although data for an equal number of students from the collaborative and independent groups was used (n=64).

First round of data collection (collaborative and independent writing)			
Class group 1 Registered = 22 Participated = 16	Class group 4 Registered = 24 Participated = 16	Class group 2 Registered = 22 Participated = 18	Class group 3 Registered = 22 Participated = 17
Second round of data collection (collaborative and independent writing)			
Class group 6 Registered = 24 Participated = 16	Class group 8 Registered = 24 Participated = 16	Class group 5 Registered = 22 Participated = 13	Class group 7 Registered = 20 Participated = 16

Figure 6. 4 Student enrollment and final participation per class

6.8.2 Participant mortality

The number of students enrolled in each class group that was involved in this study and the number of students whose data was used was different as can be seen in figure 6.4 previously shown. For example, for class group 1 there were 22 students enrolled in this section, but the data for 16 of these students was included. The number of students enrolled in each class group and the reasons why their data was not included is shown in detail in appendix I.1, but I have summarized the main reasons why the data was excluded from this study for all of the sections that made up the collaborative and independent writing groups. This can be seen in table 6.1 below.

Table 6.1 Participant mortality

Reason why student data was not used	Collaborative groups	Independent groups
Registered but not enrolled	6	5
Dropped	6	4
Pre/post test writing not completed (NC)	11	8
No permission (consent not given)	6	4
Illegible script	1	1

A similar number of students from the classes that made up the collaborative and independent writing groups were registered but not enrolled which meant that they were moved to another section just before the start of the course; normally to readjust the number of students per class. A similar number of students in the collaborative and independent writing groups dropped the course, did not complete one of the pre and post-test writing activities, did not give consent for their data to be used, or had one illegible script that could not be analysed. The primary reason why student data was not included in this study was because either the pre or post-test writing activity was not completed. In the majority of cases, students were absent when the post-test writing activity was carried out even though they had been present throughout the course. Time constraints meant that there was not an additional opportunity to complete post-test writing as this was completed at the end of the course.

6.9 Collection of data

Overview

In this quantitative study, I collected data about pre and post-test writing and about the number and ratio of language related episodes that learners engaged in while writing collaboratively. Data about the pre and post-test writing of both groups could be analysed to assess changes that occurred in the individual writing over time of the students who completed either collaborative or independent writing. The only difference was that during an 8-week period, students forming the collaborative group (class groups 1,4,6 and 8) completed a series of writing activities collaboratively while students from the independent group (class groups 2,3, 5 and 7) completed the same series of writing tasks independently. Analysis of collaborative writing dialogue provided examples of student interaction and of language related episodes that illustrated how this writing procedure could possibly lead to learning

6.10 Instruments

6.10.1 Pre and post-test writing activities

Polio and Park (2016) stress that when texts are collected over time, we need to be sure that the tasks that students have completed are comparable, otherwise we cannot be sure that changes are due to development, or simply due to the differences between the tasks themselves (p.299). To ensure that the pre and post-test writing tasks were similar and that differences between them did not significantly affect the results, I selected two writing tasks that had been used extensively as writing diagnostics for another unrelated English course (writing task A and writing task B – see Appendix A.1 and A.2). These writing activities had been reviewed and shown to have the same level of difficulty. These were chosen because they were related to the same type of expository writing as different genres have been shown to affect language use (Mazgutova and Kormos 2015, p.4).

Also, both writing tasks were about similar topics which allowed a comparison between the two pieces of writing. The importance of this choice is that the topic that students write about can affect the language that they use. For example, Yoon (2017) found that when students completed expository writing about very different topics, this led to significant differences in the linguistic complexity of the writing that they produced (p.135-136). This is why the two writing tasks selected were about similar, but not identical topics.

Finally, I counterbalanced both writing activities and used the two different writing tasks as either the pre-test writing activity, or as the post-test writing activity during the two rounds of data collection: a process recommended by Polio (2011, p.152). For example, writing **task A** was first used for the pre-writing task and then **task B** for the post-test writing. This was inverted for the second-round, thus **task B** was used for pre-task writing and **task A** for post-test writing (see figure 6.5 below).

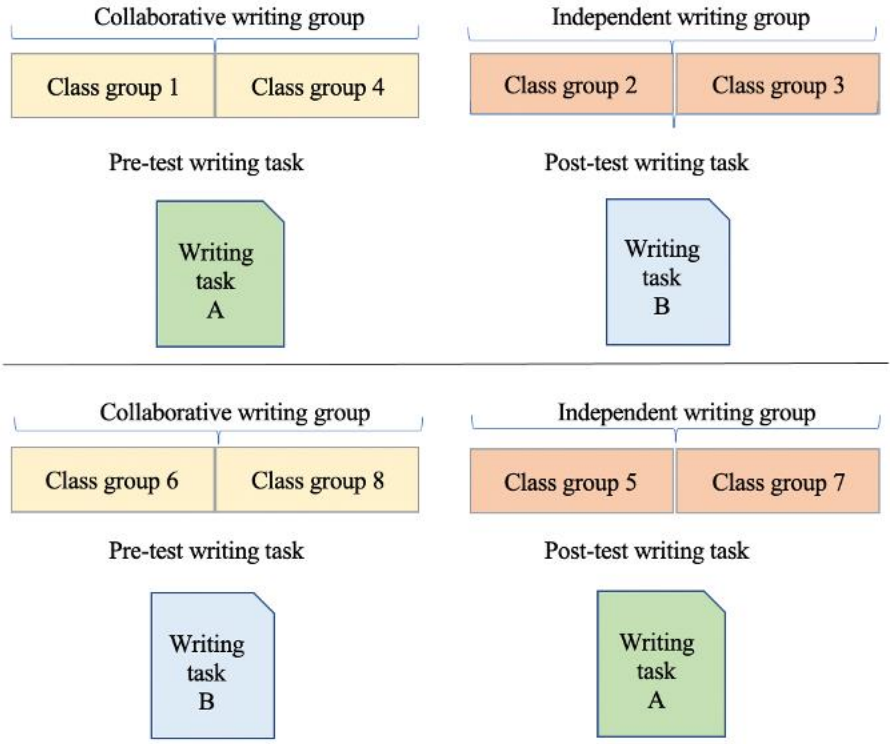

Figure 6. 5 Order of pre and post-test writing activities

By doing this, there was also no way for assessors to know which writing task had been completed first because all identifying information was removed from the scripts. The 256 scripts were also randomly ordered and assigned a number from 1 to 256 which was the only identifying information shown (see Appendices B.1 and B.2).

6.10.2 Recorded collaborative dialogue

Student dialogue was recorded for each pair of learners who completed collaborative writing. One quarter of all collaborative dialogue was transcribed and subsequently analyzed (n=94). The language related episodes identified were Form-focused F-LREs relating to the use of grammar, lexical L-LREs and mechanical M-LREs relating to the use of punctuation and spelling. These LREs had been identified in previous studies into the use of collaborative writing in L2 carried out by Storch (2007), Storch and Wigglesworth (2007), Wigglesworth

and Storch (2009), Dobao (2012) and Villarreal and Gil-Sarratea (2019). I also identified D-LREs related to the use of written discourse; specifically to cohesion and the organization of text (Fortune and Thorp 2001). While a language related episode is not learning in itself, it can be used to explain, or provide a fuller picture of how language develops, or why possible learning occurs. For example, increases in measures of post-test writing accuracy may indicate that students have learned to use grammatical structures correctly and this change may be traced back to peer discussion about language use through form focused and lexical LREs.

6.11 Analysis

In this study two types of **analyses** were carried out. Firstly, the analysis of individual student pre and post-test writing from the collaborative and independent writing groups. Secondly, the identification of language related episodes in transcribed dialogue of students completing collaborative writing.

6.12 Analysis of individual pre and post-test writing samples

When the individual learner's pre and post-test writing is assessed, differences between measures of language use (relating to the writer's linguistic competence) and measures of discourse competence (relating to the writer's knowledge of written discourse) may indicate how the writing of students from each group has developed as a result of completing either collaborative or independent writing (Bulté and Housen 2014, p.43). I have analyzed the pre and post-test writing samples of students from the collaborative and independent writing groups to gauge the degree of change between them. This allowed me to assess the effects of carrying out collaborative writing on the individual writing proficiency of English second language learners in an EAP Program and to compare this to how post-test writing changes as a result of writing independently. In most cases, writing was assessed using the students' hand-written scripts (with all identifying information removed) however for some analysis the hand-written data was transcribed when computer analysis was required.

6.12.1 Analysis of pre and post-test writing assessment data

Analysis of the pre and post-test scripts of students from the collaborative and independent writing groups involved three sets of procedures: namely manual evaluation of texts, computerized assessment, and combined manual and computerized evaluation. The measures used are listed according to the type of the evaluation procedure in table 6.2 overleaf.

Table 6. 2 Three different types of text evaluation procedures

Manual	Computerized	Manual + computerized
Identification of different types of errors in text Identification of sentences and sentence types Identification of cohesive conjunctions, noun reference pairs and noun synonym pairs Identification of sentences that needed to be reread, that were difficult to understand, or that were not connected to others in the text.	Calculation of lexical diversity Calculation of lexical sophistication Calculation of words per text Calculation of words per sentence	Identification of t-units Identification of mean number of words per t-unit Calculation of the number and ratio of error-free t-units Calculation of mean number of words per error free t-unit Calculation of mean length of noun phrase.

Before looking at the different measures that were used to identify and evaluate changes in the linguistic and rhetorical features of the students' individual text, I will firstly outline the steps taken to complete manual evaluation of texts, computerized assessment, and combined manual and computerized evaluation and then describe the measures used in these evaluations

6.13 Manual assessment of hand-written scripts

Overview

Polio and Friedman (2016) mention that in order for a measure to be reliable, the researcher has to ensure that the results of the measure are consistent and would be obtained by other researchers if carried out (p.24); in other words we should assume that other researchers analyzing the same data would get comparable results. A number of steps were taken to prepare the scripts for manual analysis and to establish the reliability of the measures used. These are outlined in the following coding section.

6.13.1 Coding

Preparation of writing scripts for coding and assessment

The preparation of scripts for coding and assessment was completed in **two steps**.

Step 1 – Removal of personal identifying information and assigning an identifying code

For manual assessment, the students' original hand-written scripts were used (n=256). These were collected in two sessions over a two-semester period. This meant that scripts had to be stored for an extended period of time before they were analyzed. The personal details of each student, such as name and section number were removed and each script was assigned a code to identify the group and student that it pertained to; in addition to an indicator of whether this was a pre or post-test script. The four class groups that completed collaborative writing were assigned the following codes C1,C2,C3,C4 and the other four sections that completed writing independently were labelled as I1,I2,I3,I4. The number assigned to each student (from 1 to 24) corresponded to the order of the class register, so the fifth student on the register would be labelled as 5 (see Appendix B.1, A). The labels PR (pre-test writing) or PZO (post-test writing were also used. For example, the pre-test writing of the first student in the first class that completed collaborative writing was labelled as C1-1-PR and C1-1-PZO for post-test writing. Assigning these codes allowed me to locate each student's pre and post-test writing score after scripts were randomly ordered in step 2.

Step 2 – Randomly ordering scripts, assigning a script number and removing the identifying code

For assessment the scripts of the students from the different groups were randomly ordered and all information that could identify whether the script came from a particular group or whether this was a pre or post-test script was removed. To do this, the scripts were randomly assigned a number between 1 and 256 (See Appendix B.1, A). The scripts were then ordered by number thus jumbling the order of the scripts (See Appendix B.1, B). The code identifying the group and task type was removed (e.g. C1-1-PR) leaving the number that had been randomly assigned to a particular script (see Appendix B.2). By doing this, there was no way for each assessor to know which group a particular script belonged to, nor whether this was completed as a pre and post-test task (see *Figure 6. 5* Order of pre and post-test writing activities). The number assigned to a particular script was recorded See Appendix B.1, A and B) so that the scores for

each randomly ordered numbered script could be allocated to the pre and post-test writing of the student that it belonged to (see Appendix B.11).

6.13.2 Assessment of the first and second assessor (writing)

All writing samples were assessed by the first assessor (n=256) which can be seen in appendix B.2. Afterwards, 10% of these (n=26) were randomly selected to be reassessed by the same rater to establish intra-rater reliability (see Appendix B.4). In addition to this, 25% of all scripts (n=64) were randomly selected to be assessed by the second rater (see Appendix B.3). Révész (2011) mentions that due to time and cost constraints often only a sample of the dataset can be subjected to inter-rater reliability checks (p.215). With this in mind, I randomly selected 25% of all scripts to be assessed by the second rater.

6.13.3 Preparing assessment guides and descriptors

I created guides with descriptors for all of the measures that would be manually assessed. These were used by both raters to minimize the differences between how writing was assessed (Polio and Friedman 2016, p.24). The guides for each measure related to manual assessment are shown in appendices D.1 to D.6.

6.13.4 Coder selection and training

Révész (2011) suggests that to ensure an acceptable level of reliability, it is essential to select and train coders who can apply the coding criteria consistently and accurately (p.215). For the second marker, I chose an experienced writing examiner who I had worked with for an extended period of time. We both had worked together as writing examiners and had completed numerous norming sessions over a period of 5 years. As writing assessors of a well-known exam, we assessed a large number of scripts every week. While the assessment was very similar to the one we would carry out, the measures used were not the same and as such it was necessary to complete training on how these would be used before assessment was completed.

Training

The objective of training was to review the measures to be used and the guidelines related to these and then practise assessing scripts until we were confident that we were rating these in a consistent way. To do so, we had two meetings roughly two weeks apart. In the first, we reviewed two different measures which were the identification of errors in text and of different

sentence types (simple, compound and complex sentences). In the second, we identified different cohesive devices (cohesive conjunctions, noun reference pairs and noun synonym pairs) and sentences that needed to be reread, that were difficult to understand, or not connected to others (associated with coherence).

In both meetings we followed the same steps:

1. We reviewed the guidelines and descriptors for each measure then analysed one script together.

2. This was followed by individual assessment of two other scripts and a comparison of scores which we subsequently discussed.

3. After checking the similarity of these assessments, I distributed the assessor's scripts (n=64). There was one set of scripts for each measure. Each set of scripts was the same because the writing scripts randomly assigned to the second assessor did not change. The numbers of the scripts that the second marker assessed can be seen in Appendix B.3. The only difference was that each set had a different table to note down the different features being assessed. For example, for error identification there was a table to note down the number of each type of error (see Appendix C.9).

The reason for using a different set of scripts for each measure was twofold. Firstly, I did not want the assessment of one measure to be potentially influenced by another. Secondly, identifying different elements, such as errors and different types of sentences on one script, would logically cause confusion. The primary reason for conducting two training meetings. was that I did not want to overwhelm the second assessor with all of the measures in one go. After training and the assessment of all scripts had been completed, I then checked the rater reliability of the first and second assessors. This is detailed in the following section.

6.13.5 Checking intra and inter-rater reliability

If a coding protocol is reliable, then another assessor following the same procedure would be able to code in a consistent or nearly identical way and there should also be a high degree of consistency between ratings when the same rater assesses the same data on two separate occasions (Révész 2011, p.204). These two facets are assessed by measuring intra and inter-rater reliability. To establish the consistency of my own assessment, I reassessed 10% of the scripts that I had originally rated for all measures of manual assessment and compared the

rating of these to how I rated originally. By doing this, I could establish intra-rater reliability calculated through simple percentage agreement (see **Intra-rater reliability** below). To establish the inter-rater reliability of both first and second assessors, or the degree to which both assessors rated or coded in the same way, I compared the results of the scripts analysed by the second assessor (n=64) to my own (see Appendix B.8). By comparing the number of the second marker's sampled scripts with the same rating as those I had originally assessed, I could calculate the rate of inter-rater reliability using simple percentage agreement **(**see **Inter-rater reliability** overleaf).

Intra-rater reliability

Because a second examiner assessed 25% of all scripts, this meant that 75% of the total scripts were assessed by only one examiner. Given this large percentage, it was important for me (as the first examiner) to reassess a random sample of the scripts originally examined. By comparing my assessment of the same scripts at two different points of time, I could establish the consistency of my own assessment. If there was a very high degree of similarity between the assessment of the same script at two different points of time, or if it had been assessed in an identical manner, then this would mean that 75% of the total scripts that were only assessed by one examiner were being rated consistently. As the first assessor, I reassessed 10% of the scripts (n=26) which were randomly selected for all measures of manual assessment (see Appendix B.4). The rates of intra-rater reliability for the different measures are shown in the table below.

Table 6. 3 rates of intra-rater reliability for manual assessment (scripts n=26)

Identification of :	Simple percentage agreement
Grammatical, lexical, and spelling errors	96.1% = 25/26 scripts
Type of sentence	100% = 26/26 scripts
Cohesive devices (by type)	92.3% = 24/26 scripts (Cohesive conjunctions) 96.1% = 25/26 scripts (Noun/reference pairs) 100%= 26/26 scripts (Noun/synonym pairs)
Sentences that needed to be reread, were difficult to understand, or not connected to others.	100% = 26/26 scripts

In the few cases where there were differences in scores (as shown above), this generally involved instances where I missed one of the points identified in my original assessment. The verification of intra-rater reliability thus revealed a high degree of consistency in the way in which I assessed writing; differences occurring most probably due to "slips" rather than changes in the way that I assessed. With this in mind, I was confident that I had assessed consistently in my original assessment for all measures.

Inter-rater reliability

Inter-rater reliability was assessed by calculating the total number of scripts where both assessors had the same rating; comparing this to the total number of scripts assessed. The numbers of scripts that were assessed by the second marker are shown in Appendix B.3. Polio and Shea (2014) suggest that it is likely that intra-rater reliability will always be higher than inter-rater reliability because there is one less source of variation introduced; due to the fact that it represents the impression of one assessor rather than of two (p.14). Polio and Friedman (2016) suggest that rates of .80 which equate to 80% simple percentage agreement are generally considered to be acceptable (p.111) and the rate of inter-rater reliability for all measures of manual assessment in this study were superior to this (shown in table 6.4 below). The differences between both assessments were also resolved after the rate of inter-rater reliability had been identified (see **Resolving differences between both assessments** and **Resolving assessment differences through discussion** in the following sections).

Table 6. 4 Rates of inter-rater reliability (scripts n=64)

Identification of :	Simple percentage agreement
Grammatical, lexical, and spelling errors	81.3% = 52/64 scripts
Type of sentence	81.3% = 52/64 scripts
Cohesive devices (by type)	85.9% = 55/64 scripts (Cohesive conjunctions) 81.3% = 52/64 scripts (Noun/reference pairs) 87.5% = 57/64 scripts (Noun/synonym pairs)
Sentences that needed to be reread, were difficult to understand, or not connected to others.	84.8% = 54/64 scripts

6.13.6 Resolving differences between both assessments

Even though there was an acceptable rate of inter-rater reliability between the first and second markers, it was necessary to resolve the differences between scores for the scripts where the rating was different for both assessors. By doing so, I could be confident in the assessment of all data. Appendix B.8 shows differences between both assessors in relation to the 64 scripts assessed by the second marker and the comparison of these to the scores of the first assessor's scripts. For a large number of scripts, both assessors had the same rating (i.e. they had identified the same number of errors in each script, or the same number of different sentence types in the text) however a number of these were not the same (see Appendix B.8 and Appendix B.10).

Resolving assessment differences through discussion

The differences in the assessment of both raters were resolved through **discussion.** This was outlined as one of the four ways or methods to resolve differences in assessment by Johnson, Penny, Gordon, Shumate & Fisher (2005, p.121-123). In simple terms, this involved both assessors reviewing the differences in their assessment of a particular script, discussing why each feature had been identified or coded in a particular way and then finally coming to an agreement on a definitive assessment for this particular script.

This process was facilitated by the fact that each examiner had highlighted the different features being identified or assessed on the writing scripts. For example, when assessing errors in writing, both assessors could place their assessment of a particular writing script side-by-side and see how they had identified (or highlighted) different errors. By doing this, both assessors could easily see when the identification of an error had been missed by one examiner. They could also clearly see when a word or expression had been categorized in a different way and discuss this until an agreement was reached on how it should be coded. When both examiners agreed on the assessment of a particular script (according to the measure being used), this was recorded on a blank script and the rating was recorded in the final version of the data that would be analysed (see Appendix B.10). At the end of this process, there was 100% agreement between both examiners relating to all 64 of the scripts assessed (by the second assessor) and the final scores for each measure were recorded.

6.14 Computerized assessment of transcribed scripts

To complete computerized analysis, hand-written texts were transcribed. Clearly the accurate transcription of the original hand-written texts was vital. Accordingly, every text was professionally transcribed and then I reviewed each transcription, checking each against the original text and confirming that each transcription completed was 100% accurate. A sample of the transcriptions (n=64) were also randomly selected and reviewed by the second marker (following the process outlined above). No discrepancy was found by this assessor and the randomly selected transcribed scripts were also deemed to be 100% true to the original texts.

6.14.1 Preparation of transcribed texts for computerized analysis

The texts were transcribed exactly as they were written which meant that they generally included spelling mistakes and other errors (see Appendix A.3). These scripts were needed when completing measures combining manual and computerized assessment (see 6.15 **Combined manual and computerized assessment**) and were not changed in any way.

However, for certain measures involving computerized analysis, such as measurement of lexical diversity, lexical sophistication and mean number of words per noun phrase, spelling had to be corrected before assessment was completed to avoid incorrect results. Accordingly, another set of spell-checked scripts were created and saved for this analysis (see Appendix A.4).

When spell checking words, those that were not recognizable were removed. For example, misspelt words like “nessassary” were easy to recognize, but others like “incopree” were not and thus removed. In the case where the writer had possibly written a different word than the one intended, e.g. they speak to **there** friend, I did not change this word, but instead left it as it was. I also did not correct grammar mistakes, e.g. he **go** to the bank, but instead simply corrected words that were spelt incorrectly.

6.14.2 Assessing data

As computer applications were used for these measures, it was not necessary to use a second assessor to code the measures using computerized assessment, or to carry out intra and inter-rater reliability. The scores for this assessment were used for analysis without further checks being carried out.

6.15 Combined manual and computerized assessment

A combination of manual and computerized assessment was used for a number of measures. As its name suggests, these measures involved elements of manual and basic computerized assessment. This ranged from those that needed writing to be manually reviewed after computerized analysis was carried out, to assessment that required writing to be manually assessed first before subsequent computerized analysis could be completed. For example, computerized identification of t-units was generally without error, but sometimes there were issues with the tagging of t-units in compound sentences (that contained two t-units). With this in mind, all identified t-units were manually reviewed before being included in analysis. Other measures such as the identification of mean number of words per error-free t-unit in each text needed manual identification of errors to be completed first (completed as part of **Manual assessment of hand-written scripts** previously described) before the computerized calculation of the mean number of words per error-free t-unit in each text could be produced.

6.15.1 Preparation of transcribed texts for manual/computerized analysis

For this type of analysis, texts were used that had been transcribed exactly the way they were in the hand-written script and thus contained all of the spelling mistakes and errors of the original texts (See Appendix A.3). The advantage of using transcribed text was that writing could be manipulated and divided into t-units and thus I could calculate the mean number of words in each of these, or the mean number of words per error-free t-unit. The only exception to this was the calculation of the mean number of words per noun phrase where spelled checked scripts were used (See Appendix A.4).

6.15.2 Assessing data

As a computer was primarily used for these measures, it was not necessary to use a second assessor to code the measures using computerized assessment, or to carry out intra and inter-rater reliability. The scores for this assessment were used for analysis without further checks being carried out

6.16 Measures of writing

The measures described in this section are a combination of manual, computerized or combined manual/computerized assessment. These assess two aspects of writing which relate to the linguistic and rhetorical features of text.

6.16.1 Linguistic and rhetorical features of writing

When completing an experimental writing study, Polio (2011) stresses that it is important to analyze the effects of a particular activity, not only on the linguistic aspects of writing such as the accuracy or fluency of writing produced, but also on the features of written discourse that may characterize the writing that students complete (p.152). Apart from the need to take a more global view of writing development, it is also important to look at how a change in one aspect of writing, such as language use, may influence other aspects, such as the writer's ability to communicate his or her ideas through written text. Polio and Friedman (2016) stress that we need to consider how the dependent variable we are focusing on may impact or interact with other variables (p.27). For example, writing may become more complex as students try out more elaborated sentential structures and more advanced lexis, but this may initially lead to writing that is more difficult to understand and follow if the writer has not mastered these new structures. Reporting of both of these linguistic and rhetorical elements would thus paint a more complete picture of how writing has changed. With this in mind, this study focused on two aspects of writing. Firstly, the linguistic development of text relating to complexity, accuracy, and fluency and then on rhetorical features associated with the coherence and cohesion of text.

6.16.2 Linguistic measures of pre and post-test writing samples

Writing in L2 requires students to learn about the target language. A second language writer's ability to express him or herself through writing is clearly related to knowledge of the target language and consequently a restricted bank of words, or grammatical constructions limits what can be said (Schoonen, Stoel, Hulstijn, & de Glopper 2011, p.32-33). Pallotti (2009) also stresses that errors in language use in writing can impede understanding (p. 592), therefore students must also learn to correct these errors so that writing can be clearly understood.

In this study, I assessed how carrying out either collaborative or independent writing affected the linguistic features of written discourse by measuring the complexity, accuracy and fluency of the individual writing students completed before (pre-test) and after (post-test) collaborative or independent writing had been carried out and the degree of change between these two

measures which Bulté and Housen (2014, p.43) suggest are indicative of language development and learning. From the numerous possible measures of complexity, accuracy and fluency outlined by Wolfe-Quintero et al (1998), I selected progress-sensitive measures that would be able to pick up shifts or changes that could possibly occur over a short period of time (re Bulté and Housen 2014).

6.16.3 Measuring complexity, accuracy, and fluency in pre and post-test writing

Complexity

Polio (2011) stresses that complexity is comprised of both syntactic and lexical complexity (p.146), and both of these aspects can be measured in L2 writing. The assumption behind these measures is that writing will become more complex and elaborated as language develops. As second language writers progress, they may move from using single clause simple sentences to the use of compound sentences and then to using complex sentences which unify dependent and independent clauses (Martínez 2018, p.7). This expansion also may result in longer sentences with more words per sentence. Lexical complexity is seen in terms of lexical diversity, lexical sophistication and the writer's ability to produce longer noun phrases.

The measures that I selected to gauge syntactic complexity are:

a. Average sentence length (sentential complexity)
b. The number and ratio of simple, compound, and complex sentences per text (clausal complexity)
c. Mean length of noun phrase (phrasal complexity)

Ortega (2015) suggests that different areas of complexity may be relevant at one given proficiency level, but irrelevant, or at least less predictive of growth at another (p.90) and recommends a range of measures of complexity, such as sentential, phrasal, and clausal syntactic complexity which I have used in this study.

In terms of lexical complexity, measures were used which also focused on different aspects of lexical elaboration. These are:

a. Lexical diversity. This assesses the range and variety of words used; measured by the diversity index (*D*) (See Malvern, Richards, Chipere and Durán 2004).

b. Lexical sophistication. This compares the percentage use of simpler high-frequency words to the percentage of more advanced low-frequency lexis.

The measures of complexity used in this study and their relation to learning in L2 writing are outlined in the table below.

Table 6.5 Measures of complexity used in this study

Measures of complexity	
Measure of learning	Learning operationalized by:
Average sentence length	Increases in the mean number of words per sentence
Ratio of simple, compound and complex sentences	Decreases in the ratio of simple and compound sentences and increases in the ratio of complex sentences.
Mean length of noun phrase	Increases in the mean number of words per noun phrase
Lexical diversity index (*D*)	Increases in the lexical diversity index (*D*) indicating a wider range of words used per text
Lexical sophistication	Decreases in GSL 500 words and increases in more advanced GSL 1000, 2500 and off-list words

Assessment procedure

Average sentence length was calculated using the Coh-metrix tool (see McNamara, Graesser, McCarthy, & Cai, 2014) by analyzing transcribed writing scripts. Manual identification of simple, compound, and complex sentences was completed by two assessors (see **6.13.2 Assessment of the first and second assessor**) using an assessment guide (see Appendix D.1). The ratio of each sentence type was calculated by comparing the number of each type of sentence by the total number of sentences in each script. The rate of intra-rater reliability of the first assessor for this assessment was high (100% = 26/26 scripts). A comparison of the scripts assessed by the first and second assessors revealed 81.3% simple percentage agreement between the rating of both (52/64 scripts). The differences between ratings (12/64) were resolved through discussion; meaning that both assessors agreed on the final assessment of these scripts. Mean length of noun phrase was calculated using the text blob tool (Loria 2018) to identify noun phrases in each text which I manually reviewed. This data was used to calculate the average length of noun phrase in each text. The D_Tools program (Meara and Miralpeix, 2018) was used to gauge the lexical diversity of transcribed writing samples (see Appendix C.7). The LancsLex: Lancaster Vocab Analysis Tool (Brezina 2017) was also used to assess the lexical sophistication of transcribed pre and post-test writing to identify words from the GSL 500, 1000, 2500 and off-list word groups (see Appendix C.8).

Accuracy

Measures of accuracy can indicate the density and types of errors in student writing. Polio (2012) suggests from a writing perspective, essays with fewer errors will undoubtedly be judged as being of higher quality (p.377). However, Pallotti (2009) stresses that it is also important to consider the type of errors that have been made given that errors that hinder comprehension clearly have a greater impact on the communicative effectiveness of a piece of writing than those that do not compromise communication (p. 592).

To measure accuracy, the measures I used consider both global errors and errors by type. Polio (1997) stresses that with homogeneous populations, a more fine-grained measure of accuracy, such as an error-count may be needed (p.117). She also suggests that it is possible to count and classify errors by type (Polio 2003, p.94). I have taken these recommendations into consideration when preparing the measures listed below.

Global accuracy measures

a. Number and ratio of error-free T-units in each text

Accuracy measures by type

a. Number of lexical errors per text (per 100 words)
b. Number of grammatical errors per text (per 100 words)
c. Number of spelling errors per text (per 100 words)

The measures of accuracy and their relation to learning in L2 writing are outlined in table 6.6 below.

Table 6.6 Measures of accuracy used in this study

Measures of accuracy	
Measure of learning	Learning operationalized by:
Number and ratio of error-free T-units per text.	Increases in the mean number and ratio of error-free T-units per text.
Number of lexical, grammatical and spelling errors per text (per 100 words)	Decreases in the number of lexical, grammatical and spelling errors per text (per 100 words)

Assessment procedure

Manual identification of grammatical, lexical, and spelling errors was completed by two assessors (see **6.13.2 Assessment of the first and second assessor**) using an assessment guide (see Appendix D.6). The different types of errors were highlighted on each script and the

number of each was recorded (see Appendix C.9). The number of grammatical, lexical, and spelling errors per script (per 100 words) was then calculated. The rate of intra-rater reliability of the first assessor for this assessment was high (96.1% = 25/26 scripts). A comparison of the scripts assessed by the first and second assessors revealed 81.3% simple percentage agreement between the rating of both (52/64 scripts). The differences between ratings (12/64) were resolved through discussion; meaning that both assessors agreed on the final assessment of these scripts. To establish the number and ratio of error-free T-units per text, the highlighted errors that had been identified in the hand-written scripts were added to the transcribed texts. Then the sentence extractor + T-Unit calculator tool (Cobb, 2017) was used to break each text down into t-units. By doing this, it was possible to count the number of non-highlighted, error-free T-Units for each writing sample and to calculate the ratio of error-free t-units.

Fluency

Fluency is commonly measured by the amount of language that students can produce in a given period of time (Yoon and Polio 2017, p 279). In this study, I have selected three measures that Wolfe-Quintero, Inagaki and Kim (1998) stress have been shown to distinguish between different levels of proficiency. These measures assess the number of words or the amount of written language that a student can produce in a given period of time, the writer's ability to use more elaborated t-units (indicative of increased fluency in writing) and the amount of written language the writer is capable of producing that is error-free (p.119).

a. Words per text
b. Words per t-unit
c. Words per error-free t-unit

Words per error-free t-unit includes elements of accuracy and complexity, but it also highlights the writer's ability to write longer, more elaborated sentences that are error-free within a given period of time. The measures are shown in table 6.7 below.

Table 6.7 Measures of fluency used in this study

Measures of fluency	
Measure of learning	Learning operationalized by:
Words per text	Increases in the number of words per text
Words per t-unit	Increases in the mean number of words per t-unit (per text)
Words per error-free t-unit	Increases in the mean number of words per error-free t-unit (per text)

Assessment procedure

The number of words per text was indicated in samples of writing that had been previously transcribed. The sentence extractor + T-Unit calculator tool (Cobb, 2017) was used to break each text down into t-units and this also calculated the mean number of words per t-unit (per text). The t-units that did not contain errors had previously been identified when assessing accuracy (see **Accuracy**. **Assessment procedure**) and the mean number of words for these error-free t-units was calculated using the sentence extractor + T-Unit calculator tool.

6.13.4 Analysis of the rhetorical features of writing

The writer's ability to express his or her ideas in writing relate to the discourse competence of the writer. Celce-Murcia, Dörnyei and Thurrell (1995) mention that this involves the selection, sequencing, and arrangement of words, structures and sentences to achieve a unified and coherent written text (p.13). Two rhetorical features that were assessed in this study and that are central to the writer's ability to communicate his or her ideas in writing are **coherence** and **cohesion.**

Coherence

Coherence measures how easily the ideas presented by the L2 writer can be followed and understood; represented by the **ease of interpretation** and the **interrelatedness** of the ideas that are presented (Celce-Murcia *et al* 1995, p.15). Polio (2003) suggests that there is no commonly identifiable construct to assess coherence (p.42) and Knoch (2007) has stressed that previously used rating scales have not been able to operationalize coherence in writing in a manner that can be successfully used by raters (p.109). Existing holistic rubrics have been designed to assess coherence in the document as a whole rather than being used to detect changes in measures of coherence between pre and post-test writing. With this in mind, I created four measures that were trialed before being used in this study. Assessors reported that the measures were very easy to apply and described the level of coherence of the sampled texts.

These were:

1. The number and ratio of sentences that needed to be reread per text
2. The number and ratio of sentences that were difficult to understand per text
3. The number and ratio of sentences that had no logical connection with the sentences around them
4. The number and ratio of sentences that did not cause difficulty for the reader

The measures of coherence and their relation to learning in L2 writing are outlined in table 6.8 below.

Table 6. 8 Measures of coherence used in this study

Measures of coherence	
Measure of learning	Learning operationalized by:
The number and ratio of sentences (per text) that needed to be reread to understand the writer's message	Decreases in the number and ratio of sentences that needed to be reread to understand the writer's message
The number and ratio of sentences (per text) that were difficult to understand	Decreases in the number and ratio of sentences that were difficult to understand
The number and ratio of sentences (per text) that had no logical connection with the sentences around them	Decreases in the number and ratio of incongruous sentences
The number and ratio of sentences (per text) that did not cause difficulty for the reader	Increases in the number and ratio of sentences that did not cause difficulty for the reader

Assessment procedure

Manual identification of sentences that were difficult to understand, needed to be reread, or that had no logical connection with those around them was completed by two assessors (see **6.13.2 Assessment of the first and second assessor**) using an assessment guide (see Appendix D.5). From this identification, it was possible to establish the remaining number of sentences that did not cause difficulty for the reader per text. Each sentence received a singular classification and therefore it was possible to calculate the ratio of each type of sentence by comparing the number of these sentences to the total number of sentences in the text. The rate of intra-rater reliability of the first assessor for this assessment was high (100% = 26/26 scripts). A comparison of the scripts assessed by the first and second assessors revealed 84.8% simple percentage agreement between the rating of both (54/64 scripts). The differences between ratings (10/64) were resolved through discussion; meaning that both assessors agreed on the final assessment of these scripts.

Cohesion

Cohesion refers to the connection of ideas within a text. Writers must learn to present ideas and link them so that they relate to one another. To do this, they can use cohesive devices such as cohesive conjunctions (e.g. firstly, therefore, however), or referencing (e.g. the man-he) and by using lexical cohesion. The latter involves using noun/synonym pairs that help the writer to refer to the same person or thing within a paragraph or text (Halliday and Hasan 1976). I have assessed the total number of cohesive devices used. I reviewed previous studies into the use of cohesion in L2 writing (e.g. Yang and Sun 2012; Querol 2003; Struthers, Lapadat & MacMillan 2013) before selecting the measures outlined in table 6.9 below.

Table 6.9 Measures of cohesion used in this study

Measures of cohesion	
Measure of learning	Learning operationalized by:
The number of cohesive conjunctions used per text (per 100 words)	Increases in the number of cohesive conjunctions used
Number of noun-reference pairs used (per text (per 100 words)	Increases in the number of noun-reference pairs used
The number of noun / synonym pairs per text (per 100 words)	Increases in the number of noun / synonym pairs per text

Assessment procedure

Manual identification of the different types of cohesive conjunctions was completed by two assessors (see **6.13.2 Assessment of the first and second assessor**) using three different assessment guides (see Appendix D.2, D.3, D.4). The different types of cohesive devices were highlighted on each script and the number of each was recorded (see Appendix C.12, C.13, C.14). The number of cohesive conjunctions, noun-reference pairs, and noun/synonym pairs per script (per 100 words) was then calculated. The rate of intra-rater reliability of the first assessor for this assessment was high (92.3% = 24/26 scripts for cohesive conjunctions, 96.1% = 25/26 scripts for identification of noun/reference pairs and 100% = 26/26 scripts for noun/synonym pairs). A comparison of the scripts assessed by the first and second assessors revealed 85.9% agreement (55/64 scripts) for the identification of cohesive conjunctions, 81.3% agreement (52/64 scripts) for noun/reference pairs and 87.5% agreement (57/64 scripts) for noun/synonym pairs between the rating of both. The differences between ratings, i.e. (9/64 scripts) for cohesive conjunctions, (12/64 scripts) for noun/reference pairs and (7/64 scripts) for noun/synonym pairs were resolved through discussion; meaning that both assessors agreed on the final assessment of these scripts.

6.17 Identification and analysis of LREs in collaborative writing dialogue

To assess whether students were engaged in language related episodes while completing collaborative writing, I recorded student dialogue as they worked together. To identify LREs, a sample of 25% of collaborative dialogue was transcribed and analysed to identify LREs associated with learning (n=94). As a sample of collaborative writing dialogue was used, all of the examples in this sample were assessed by the first and second assessor. The LREs that were identified were form-focused F-LREs (relating to the use of grammar), lexical L-LREs and mechanical M-LREs (related to the use of spelling and punctuation). These were used in previous studies carried out into the use of collaborative writing in L2 by Storch (2007), Storch and Wigglesworth (2007), Wigglesworth and Storch (2009), Dobao (2012) and Villarreal and Gil-Sarratea (2019).

Additionally, I assessed discourse related D-LREs (Fortune and Thorp 2001) related to organization and cohesion in written text which were not analysed in the previously mentioned studies. Within the identification of mechanical M-LREs, those which related only to spelling and those solely related to punctuation were also identified. Similarly, within the identification of discourse D-LREs, I identified D-LREs solely related to cohesion and those which related only to the organization of text.

6.18 Manual identification of LREs in collaborative writing dialogue

6.18.1 Coding

To code data related to the identification of LREs in collaborative writing dialogue, a number of different steps were taken. These are outlined in the following sections.

6.18.2 Preparation of transcripts of collaborative writing dialogue

Student dialogue was recorded for each pair of learners who completed collaborative writing. One quarter (25%) of all collaborative dialogue was transcribed (n=94). The transcription of each example of collaborative writing took a long time to complete and that is why a sample of collaborative dialogue was used. The remaining 75% of collaborative dialogue was discarded and was not used in this study. Dialogue was transcribed professionally by a bilingual English/Arabic transcription service. The reason for doing this was that students would occasionally slip into the use of their own language and as such this required a person who could speak English and Arabic fluently and who could dedicate the time to transcribe the large

amount of spoken dialogue. Arabic use was primarily associated with the use of discourse markers, such as *well*, or *you know* while conversing. However, it was important to ensure that this was translated correctly and written in the script in such a way that the assessor would know that Arabic was being used. The transcriber also was able to highlight these instances using ***italic script*** in each transcription. This is shown in the example below.

S1 When it comes to immigration…

S2 ***Yeah***… when it comes to immigration … both…

S1 Find a synonym for both… [From collaborative dialogue 39]

The accurate transcription of dialogue was clearly important and a number of steps were taken to ensure this. All transcriptions of the samples of collaborative writing dialogue were reviewed by the second marker who is also a bilingual English/Arabic speaker. She listened to all of the samples of dialogue that had been transcribed and verified that these had been transcribed correctly. As collaborative writing dialogue was completed almost exclusively in English, I also listened to dialogue and reviewed the scripts checking for accuracy and that the tone of what was said had been transcribed correctly. The transcription of collaborative writing dialogue was thus checked twice and confirmed to be accurate.

6.18.3 Assessment of the first and second assessor (LREs)

As a sample of collaborative writing dialogue was used (n=94), all of the examples in this sample were assessed by the first and second assessor.

6.18.4 Preparing assessment guides and descriptors

I created a guide with descriptors for the types of language related episodes that would be identified. These would be used by both assessors to minimize the differences between the identification of LREs. The guide for identification of LREs is shown in appendix H.1.

6.18.5 Coder selection and training

Révész (2011) stresses it is essential to select and train coders who can apply the coding criteria consistently and accurately to ensure an acceptable level of reliability (p.215). For the second marker, I chose an experienced speaking examiner who also was a bilingual English/Arabic speaker. Additionally, she had knowledge of language related episodes and of the different types of LREs; having recently completed an MA in linguistics. We both had worked together

as speaking examiners for a period of 3 years. However, the identification of LREs was not the same as the speaking assessment that we had been trained to carry out. As such, it was necessary to complete training on the identification of LREs before assessment was completed.

6.18.6 Training procedure

The objective of training was firstly to review the guidelines related to the identification of LREs in transcribed collaborative dialogue (see Appendix H.1) and then practice identifying these. This identification was completed by highlighting the different types of LREs in each sample and then noting down the number of each in a table at the end of each script (see Appendix G.1). After initial training and confirming that LREs were being identified consistently by both assessors, a portion of the scripts was distributed to both raters to be analysed.

The following meetings were used to review the scripts previously assessed and to distribute another portion of these. The reasons for the staggered distribution of scripts was to review how these had been assessed before another set of scripts were distributed. The process of periodically reviewing and discussing the assessment of scripts was thought to help reduce differences between the rating of both assessors and allowed possible differences to be resolved through reaching an agreement on the final assessment of each script. The steps to achieve this process are detailed below.

In the first meeting:

1. We reviewed the guidelines and descriptors for each measure. Then analysed 4 scripts together.
2. This was followed by individual assessment of 10 other scripts and a comparison of scores which we subsequently discussed. Differences in the identification of LREs by both assessors in this small number of scripts were reviewed and both examiners came to an agreement on the final assessment of these through discussion (Johnson, Penny, Gordon, Shumate & Fisher 2005, p.121-123).
3. After this, I gave 20 additional scripts to the second marker to be assessed before the following meeting.

In the following meetings:

1. We reviewed the scripts previously completed.
2. We discussed scripts where we had a different rating until we agreed upon a final assessment. When this was completed, the LREs that we agreed upon were highlighted on a blank version of the script and the final number of each type of LRE noted down.
4. After this, I distributed an additional 30 scripts to the second marker.

In the final meeting:

1. We reviewed the final batch of scripts previously completed.
2. We discussed scripts where we had a different rating until we agreed upon the final assessment; highlighting the LREs agreed upon on a new script and noting down the number of each type of LRE.

As training was being completed, the rate of inter-rater reliability for the assessors was calculated for each batch of scripts assessed (see table 6.10 overleaf). The rate of intra-rater reliability for my assessment was also gauged at the end of the study.

6.18.7 Checking intra and inter-rater reliability and resolving differences between assessment

After each set of scripts were assessed by both examiners, the rate of inter-rater reliability was calculated (see Appendix F.5). Even though all scripts that had been rated differently would be discussed and a final rating agreed upon, it was still important to establish the rates of inter-rater reliability because this provided an indication of how well the guide and descriptors could be used to identify each type of LRE. There was an acceptable rate of inter-rater reliability between both assessors, i.e. 84% (79/94 scripts) as shown in table 6.10 overleaf. Differences in ratings were mostly due to the fact that the identification of an LRE had been missed by one of the assessors rather than being categorized in a different way (see Appendix F.5).

All score differences were reviewed and resolved through discussion (Johnson, Penny, Gordon, Shumate & Fisher 2005, p.121-123) and as a result there was 100% agreement between both examiners on the identification of LREs in all samples. These scores were submitted for final analysis (see Appendix F.7).

Table 6. 10 - Rates of inter-rater reliability (scripts n=94)

Scripts (same rating/simple percentage agreement)	Differences in rating resolved through discussion (number of scripts)
4 scripts (4/4 same / 100% agreement)	None
10 scripts (8/10 same / 80% agreement)	2/10
20 scripts (17/20 same / 85% agreement)	3/20
30 scripts (26/30 same / 86.6% agreement)	4/30
30 scripts (24/30 same / 80% agreement)	6/30

After all scripts had been assessed, I randomly selected 10 scripts to be reassessed to establish intra-rater reliability. There was no difference between the identification of LREs in the 10 scripts that I reassessed and the ones that I had originally examined and thus there was 100% simple percentage agreement (see Appendix F.6).

6.18.8 Identifying spelling or punctuation related M-LREs and organization or cohesion related D-LREs

After the number of LREs in 94 samples of collaborative dialogue had been established and agreed upon, I reviewed the highlighted examples of M-LREs and D-LREs in all samples to determine whether each of these was associated with spelling or punctuation in the case of M-LREs, or organization of text or cohesion for D-LREs. I then noted the number of each in the table located at the end of each example (see Appendix G.1). This type of identification was only carried out by the first examiner because the different types of LREs had already been identified and agreed upon. Within the M-LREs and D-LREs highlighted, discussion related to spelling or punctuation (in M-LREs), or to organization or cohesion (in D-LREs) could be identified without difficulty. However, the completed identification by the first assessor was subsequently reviewed by the second examiner who agreed with all identification.

6.19 Measures of language related episodes

The process of learning language and learning how to write can be seen through learner interaction and may possibly be explained by the language related episodes (LREs) that learners engage in. Polio (2011) stresses that by observing students interacting about writing, we can gain insight into what they are focusing on (p.149). The number and ratio of different types of LREs that were identified while students completed collaborative writing are shown in table 6.11 below.

Table 6.11 LREs identified in collaborative dialogue

Analysis of collaborative interaction	
Number and ratio of form-focused **F-LREs** per dialogue	
Number and ratio of lexical **L-LREs** per dialogue	
Number and ratio of mechanical **M-LREs** per dialogue	
Number and ratio of M-LREs associated with spelling	Number and ratio of M-LREs associated with punctuation
Number and ratio of discourse **D-LREs** per dialogue	
Number and ratio of D-LREs associated with the organization of text	Number and ratio of D-LREs associated with cohesion

Assessment procedure

A sample of 25% of collaborative dialogue was transcribed and analysed to identify LREs associated with learning (n=94). All 94 examples were assessed by both the first and second markers. The number of F-LREs, L-LREs, M-LREs and D-LREs that students engaged in were recorded by both assessors. The rate of inter-rater reliability for this assessment was acceptable; both assessors rated 79/94 examples in the same way as a result there was 84% simple percentage agreement. The differences between ratings, i.e. (15/94 scripts) were resolved through discussion; both examiners reviewing and discussing differences between both assessments until coming to an agreement about the assessment of each script. When completed, the LREs that they agreed upon were highlighted on a blank version of the script and the final number of each type of LRE noted down (see Appendix G.1). After doing this, I reviewed all the examples of scripts and noted down the number of M-LREs that related to spelling or punctuation and the number of D-LREs associated either with organization of text or cohesion (see Appendix G.1). This was then reviewed by the second examiner who agreed with all identification.

7. Results

The results relating to pre and post-test writing are presented first and followed by those associated with the analysis of language related episodes in collaborative writing dialogue.

7.1 Analysis of pre and post-test writing scripts

7.1.1 Presentation of results

I will present descriptive statistics for the different measures relating to the linguistic, or rhetorical development of writing. These will be presented according to the degree of change noted between pre and post-test measures which may differ from the order in which they usually are presented.

7.1.2 Descriptive statistics and the results of tests of statistical significance

Descriptive statistics

I will firstly present descriptive statistics related to the different measures of pre and post-test writing, such as accuracy, fluency, complexity, coherence, and cohesion and then report the results of the tests of statistical significance related to each of these. Norris (2015) stresses that in second language research it is necessary to look at the data to identify patterns that may be revealed by graphical comparisons and descriptive statistics prior to inferential statistical testing (p.121). With this in mind, I will firstly present graphs comparing the pre and post-test mean values for the collaborative and independent writing groups along with the standard deviation of these. Further information about the dispersion of data, such as skewness and kurtosis is included in appendix C.16 **(**Measures of dispersion of pre and post-test writing). The presentation of descriptive statistics will be followed by tests of statistical significance which assess the difference between the pre and post-test means of both writing groups.

Tests of statistical significance

Wherever possible, I have used a mixed model 2x2 multivariate analysis of variance (MANOVA) that assesses a cluster, or set of conceptually related dependent variables, such as those related to accuracy for example. Scholars such as Pallant (2003, p.283) and French, Macedo, Poulsen, Waterson & Yu (2008, p.2) suggest that this test controls for the risk of Type 1 error. With each type of analysis, I will outline the interaction effect **time * treatment** on dependent variables and the main effects of **time** and **treatment** (between subjects effect) and

report the effect size of each. I will use the **Pillai's Trace** multivariate test of significance to indicate whether there are statistically significant differences among the groups on a linear combination of the dependent variables (Pallant 2003, p.294). If a significant difference is found for the combined dependent variables, the individual univariate measures will be reported as well. In this study, I have used 2x2 MANOVA analysis to assess accuracy, fluency, and cohesion in the pre and post-test writing of the collaborative and independent writing groups.

Multivariate analysis of variance could not be used for a number of measures, such as those relating to complexity (syntactic and lexical) and coherence because these measures involved interdependent variables where a change in one variable would affect another. One of the assumptions of the MANOVA test is that the dependent variables included should be moderately (and not highly) correlated (see 7.1.3- **Multicollinearity and singularity** below) and thus the MANOVA test was not used to assess complexity and coherence. For these measures, I have used a series of 2x2 ANOVA tests related to each measure (i.e. coherence, lexical and syntactic complexity) and applied a Bonferroni adjustment to control for Type 1 error (Pallant 2003, p.284). As with MANOVA analysis, I have outlined the interaction effect **time * treatment** on dependent variables and the main effects of **time** and **treatment** (between subjects effect) and reported the effect size of each.

7.1.3 Checking the assumptions of MANOVA and ANOVA tests

Before carrying out MANOVA analysis, I have verified that the assumptions of the test have been met and checked for normality, linearity, univariate and multivariate outliers, homogeneity of variance - covariance matrices, and multicollinearity and singularity as recommended by Pallant (2003, p.285-290). These assumptions were also checked for the ANOVA test (excluding those specifically relating to the MANOVA test). No serious violations of these assumptions were noted for any measure assessed. These assumptions are reviewed below.

Sample size

Pallant (2003) stresses the importance of an adequate sample size and states that having a larger sample and N values above 30 will reduce the importance of any violations of normality or equality of variance that may exist (p.285, p.293). The N value for each writing group exceeds this (e.g. n=64) as does the total number of participants in this study n=128.

Normality

Field (2018) mentions that the assumption of normality matters in small samples, but due to the central limit theorem, this is not a cause for concern in larger samples. This scholar explains that a sample size of 30 (or more) is widely accepted for the central limit theorem to apply and for normality to be assumed (p.233-236). While the sample analysed in this study exceeds this and thus normality can be assumed, I believe that it is important to check univariate normality (for ANOVA and MANOVA tests) as this may highlight anomalies in the data, and univariate normality needs to be reviewed before checking multivariate normality for the MANOVA test (Pallant 2003, p.285).

To assess univariate normality, I checked the skew and kurtosis values relating to the pre and post-test data associated with each type of assessment (e.g. the number of grammatical errors per 100 words in pre-test writing and post-test writing) and the *z*-scores associated with these (obtained by dividing the skew and kurtosis values by their standard errors). Aryadoust (2020) suggests that for samples > 50 and < 300, a z- score range of +/–3.29 is an acceptable indicator of univariate normality. As can be seen in appendix C.16, the z-scores for skew and kurtosis for each of the measures were within this range with the exception of a limited number of measures which are highlighted. Pallant (2003) mentions that the MANOVA test is reasonably robust to modest violations of normality (p.285, p.293) and thus normality is assumed.

Multivariate normality

Multivariate normality was checked by calculating the Mahalanobis distance score. Unusually high Mahalanobis distance scores may highlight cases that have a strange pattern of scores across the dependent variables, for example those that have unexpectedly high scores for one variable and unusually low scores for another (indicative of multivariate outliers discussed overleaf). Analysis of the Mahalanobis distance for the measures using the MANOVA test, revealed a maximum Mahalanobis distance value for all participants which was then compared against a critical value (obtained using a chi-square critical value table). If the maximum Mahalanobis distance value is lower than this critical value, then multivariate normality is assumed. This was the case for every measure (employing the MANOVA test) and thus multivariate normality is assumed.

Linearity

Pallant (2003, p.288-289) mentions that the assumption of linearity refers to the presence of a straight-line, or linear relationship between each pair of dependent variables and can be tested by generating a matrix of scatterplots of the pairs of variables separated by group. The plots generated for the measures relating to the collaborative and independent writing groups in this study did not reveal any obvious evidence of non-linearity and thus linearity is assumed.

Univariate and multivariate outliers

Univariate outliers were checked for each measure. For measures using MANOVA tests, univariate outliers were checked first before the identification of multivariate outliers. A review of univariate outliers generally revealed instances where data had been entered incorrectly which was subsequently corrected. The process of verifying multivariate normality involved the identification of multivariate outliers that exceeded a critical value (as outlined previously). No Mahalanobis distance scores exceeded the critical value for each measure and thus no multivariate outliers were present.

Homogeneity of variance - covariance matrices

The Box's Test of Equality of Covariance Matrices was used to check whether the data analysed violated the assumption of homogeneity of variance - covariance matrices. The significance value was greater than .001 for each test and thus this assumption had not been violated (Pallant 2003, p.294). To test whether the assumption of equality of variances had been violated, the Levene's Test of Equality of Error Variances was verified for each measure. All of these tests revealed significance values greater than .05 and thus equal variances can be assumed (Pallant 2003, p.294).

Multicollinearity and singularity.

Pallant (2003, p.290) stresses that MANOVA works best when the dependent variables are moderately correlated and that including highly correlated dependent variables (around .8 or .9) should be avoided (referred to as multicollinearity**)**. The correlation of the various dependent variables for each of the measures that employed the MANOVA test were reviewed and shown to be moderately correlated and thus the use of the MANOVA test for the measures selected was appropriate. As previously mentioned, the MANOVA test was not selected for measures that included dependent variables that were mutually exclusive; where a change in

one variable would directly affect another and thus these would logically be highly correlated. To avoid violating the assumption of multicollinearity, I used ANOVA tests for these measures. The MANOVA test also must not include variables that are a combination of other variables (referred to as singularity). When assessing accuracy, I had initially planned to assess the total number of errors combined and the number of errors by type (grammatical, lexical, and spelling) in one MANOVA test. However, as this violates the assumption of singularity, the variable relating to the total number of errors combined was removed.

7.2 Analysis of the linguistic development of pre and post-test writing

7.2.1 Accuracy

Accuracy in writing was measured by assessing the number and ratio of error-free T-units in each text. This measure indicated the prevalence of errors in writing. Accuracy was also measured by identifying the frequency of errors by type; specifically the number of (a) grammatical, (b) lexical and (c) spelling errors per 100 words per text .

Ratio of error-free t-units

Figure 7.1 shows the mean ratio of error-free t-units in the pre-test and post-test writing of students from the collaborative and independent writing groups. The mean number of error-free t-units was similar in the pre-test writing of students from both groups before the completion of either collaborative or independent writing. However, this clearly changes for writing completed at the post-test stage. The mean values are outlined below.

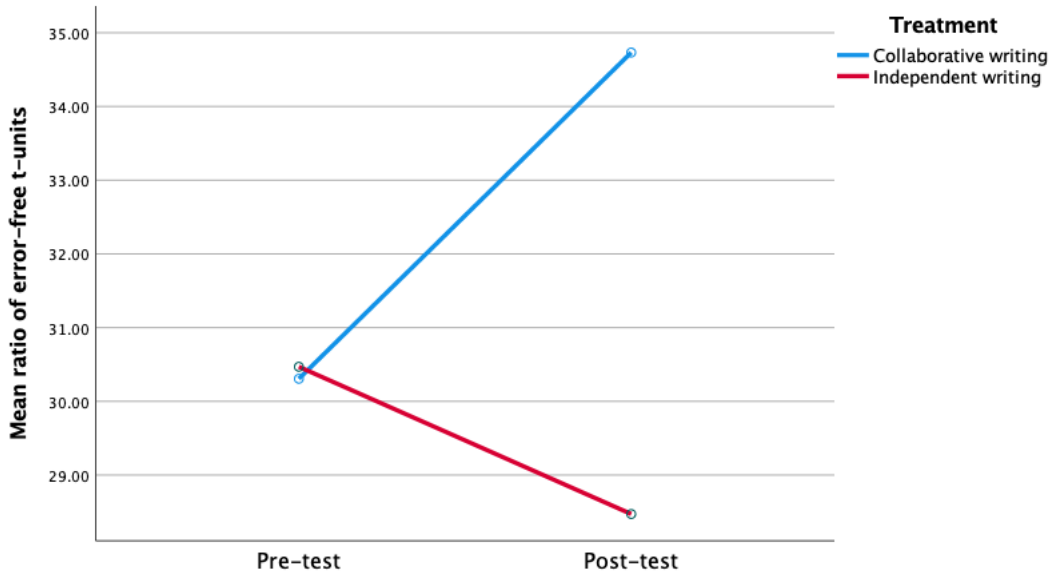

Figure 7.1- Mean ratio of error-free t-units in collaborative and independent group pre and post-test writing

The mean ratio of error-free t-units in pre-test writing was almost identical for both groups. This was *M* =30.31% (SD= 23.80) for the collaborative writing group and *M* =30.48% (SD= 21.04) for the independent group. However, changes in post-test writing led to dissimilar values for the ratio of error-free t-units of both groups. The mean increased in the collaborative writing group *M* =34.73% (SD= 22.53), but decreased moderately in the independent writing group *M* = 28.47% (SD= 20.64). This meant that errors became less prevalent in the individual

writing of students who had completed collaborative writing, but became slightly more so in independent post-test writing.

The mean number of grammatical errors per 100 words (per text)

Figure 7.2 below, shows the mean number of grammatical errors per 100 words in the pre and post-test writing of students from the collaborative and independent writing groups. The mean number of grammatical errors was initially higher in the pre-test writing of students from the collaborative writing group *M* =5.17 (SD= 3.57) than that of the independent group *M* =4.57 (SD= 3.30). However, this situation was inversed with a notable decrease in grammatical errors in collaborative group post-test writing *M* =4.29 (SD= 2.96) and a slight increase in grammatical errors in the post-test writing of the independent group *M* =4.63 (SD= 2.94).

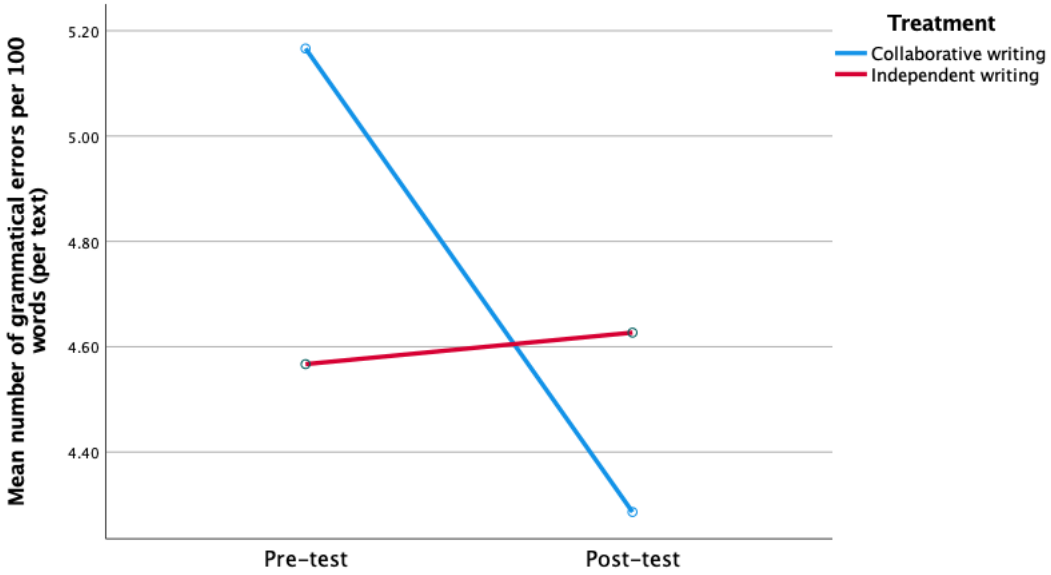

Figure 7.2- Number of grammatical errors per 100 words in independent and collaborative group pre and post-test texts

The mean number of lexical errors per 100 words per text

Figure 7.3 reveals different changes between the mean number of lexical errors in the post-test samples of both groups. The mean number of lexical errors was slightly higher in the pre-test writing of students from the collaborative writing group *M* =3.94 (SD= 2.08) than the mean number of errors of the independent group *M* =3.70 (SD= 2.09). However, this situation was inversed with a sharp decrease in lexical errors in collaborative group post-test writing *M* =3.08 (SD= 1.83) and a slight change in lexical errors in the post-test writing of the independent group *M* =3.49 (SD= 1.95).

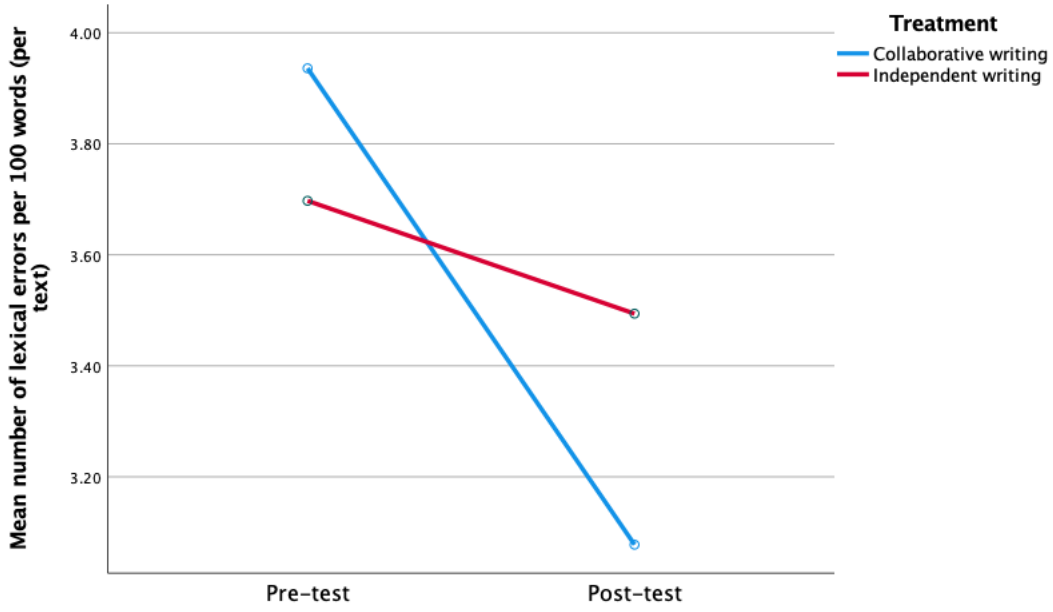

Figure 7.3- Number of lexical errors per 100 words in independent and collaborative group pre and post-test texts

The mean number of spelling errors per 100 words per text

Figure 7.4 reveals a more pronounced decrease in the mean number of spelling errors in the post-test writing of the collaborative writing group. There were initially higher values for spelling errors per 100 words in collaborative group pre-test writing *M* =3.38 (SD= 2.45) and lower values for the independent writing group *M* =3.13 (SD= 2.22) however this was inverted for post-test writing with a lower value for the collaborative group *M* =2.53 (SD= 2.03) and a higher mean value for students who completed writing independently *M* =2.98 (SD= 2.51).

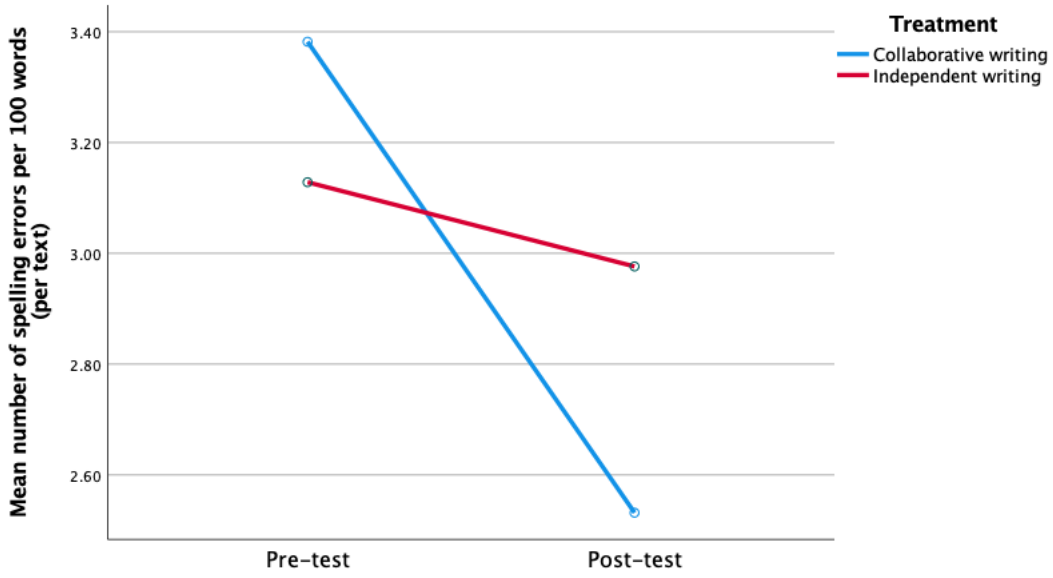

Figure 7.4- Number of spelling errors per 100 words in independent and collaborative group pre and post-test text

Tests of Statistical Significance

To test the effect of completing two different types of writing on the accuracy of individual writing produced over time, a 2x2 multivariate analysis of variance (MANOVA) was used. As previously mentioned, when a significant difference is found for the combined measures of accuracy, the univariate measures relating to each individual measure are reported as well.

This analysis was used to protect against the increased possibility of Type 1 errors associated with carrying out multiple independent ANOVA tests on the same data (French, Macedo, Poulsen, Waterson & Yu 2008, p.2). It also provided an overall measure of significance for a combination of individual measures associated with accuracy.

Multivariate (MANOVA) analysis of accuracy

Using Pillai's trace, results revealed that there was a statistically significant main effect of **time** on the ratio of error-free t-units in writing and the number of grammatical, lexical, and spelling errors per 100 words (per text), V=.194, $F(4, 123) = 7.40$, $p = .001$, $\eta_p^2 = .194$. Interpretation of this result is somewhat difficult because the interaction effect **time * treatment** is also significant and Stevens (1999) suggests this can make interpretation problematic (p.1-2). To clarify, in the previous descriptive statistics section, we have seen that there were either increases in the mean number of errors in independent group post-test writing (see figure 7.2- grammatical errors) or very moderate decreases (see figure 7.3 - lexical errors and figure 7.4 - spelling errors). The ratio of error-free t-units in independent group post-test writing also decreased (see figure 7.1). Given that there were notable increases in all individual measures of accuracy in collaborative group post-test writing, the most appropriate interpretation would be that the combined mean accuracy score of both groups increased significantly over time rather than that accuracy increased significantly over time in the writing of both groups.

The effect of **time** on individual univariate measures of accuracy produced by the MANOVA analysis was also significant in most cases, i.e. grammatical errors, $F(1, 126) = 5.62$, $p = .019$, $\eta_p^2 = .042$; lexical errors, $F(1, 126) = 13.35$, $p = .001$, $\eta_p^2 = .096$; spelling errors, $F(1, 126) = 9.67$, $p = .002$, $\eta_p^2 = .071$. However, the ratio of error-free t-units did not increase significantly for both groups, $F(1, 126) = .732$, $p = .394$, $\eta_p^2 = .006$.

Using Pillai's trace, results revealed that the main effect of **treatment** on the combined measures of accuracy was not significant, V=.021, $F(4, 123) = .650$, $p = .628$, $\eta_p^2 = .021$.

As previously mentioned, there was a significant interaction effect between **time * treatment** on the combined dependent variables relating to the accuracy of writing produced. Using Pillai's trace, results revealed that there was a statistically significant interaction effect between **time and treatment** on the combined dependent variables relating to accuracy which were the ratio of error-free t-units per 100 words and the number of grammatical, lexical, and spelling errors per 100 words (per text), V=.117, $F(4, 123) = 4.06$, $p = .004$, $\eta_p^2 = .12$. The multivariate effect size for this measure is classed as medium, but approximates the threshold of a large effect size (Cohen 1988, p.287). In the previous descriptive statistics section, we have seen that all measures of accuracy increased notably between the pre and post-test writing of the collaborative group, but that there was very little change between the measures in the independent group and even decreases in measures in some cases.

This information tells us that there was a significant difference in accuracy in the individual writing produced by the two treatment groups (collaborative and independent writing groups) over time (between pre and post-test writing). With this in mind, it seems that in general terms accuracy has increased to a significantly greater degree in individual writing completed after carrying out collaborative writing than after completing writing independently.

Univariate measures reveal that there was a significant interaction effect between **time * treatment** on the number of grammatical errors per 100 words (per text), $F(1, 126) = 7.38$, $p = .008$, $\eta_p^2 = .055$. There was also a significant effect on the mean number of lexical errors per 100 words (per text), $F(1, 126) = 5.08$, $p = .026$, $\eta_p^2 = .039$ and on the number of spelling errors per 100 words (per text), $F(1, 126) = 4.69$, $p = .032$, $\eta_p^2 = .036$, Additionally, there was a significant interaction effect between time * treatment on the ratio of error-free t-units per 100 words, $F(1, 126) = 5.13$, $p = .025$, $\eta_p^2 = .039$. These results reveal significant differences in the number of errors in individual writing over time between the collaborative and independent writing groups with more pronounced decreases in the post-test writing of the collaborative group although the effect size of these was either medium or small (Cohen 1988, p.286-287). Similarly, there was a significantly greater increase in error-free t-units between pre and post-test writing in the collaborative group than in the independent group.

Summary – changes in accuracy

Descriptive statistics revealed a pattern of notable decreases in the number of grammatical, lexical, and spelling errors in the post-test writing of the collaborative group which contrasts with very moderate decreases, or even increases, in errors in the post-test writing of the independent group. There was also a sharp increase in the ratio of error-free t-units in collaborative group post-test writing which decreased in the post-test writing of the independent group. Even though there was a significant increase for the combined measures of accuracy for the participants of both writing groups over time, this is a combination of the results of both groups and is most probably largely influenced by the increases seen in the collaborative writing group. This conclusion is supported by the fact that there is a significant interaction **time * treatment** effect on the combined dependent variables relating to the accuracy of writing produced; meaning that accuracy in writing increased by a significantly greater degree over time in the post-test writing of the collaborative group than in the writing of those who completed independent writing.

7.2.2 Fluency

The measures used to assess fluency in collaborative and independent group pre and post-test writing in this study were words per text, words per t-unit and words per error-free t-unit.

Words per text

Figure 7.5 reveals parallel increases in the mean number of words per script in the pre and post-test samples of both groups. The mean number of words per script was higher in the pre-test writing of students from the collaborative writing group *M* =247.7 (SD= 58.26) than the independent group *M* =227.8 (SD= 52.72) and there were almost identical increases in the mean number of words in the post-test writing of both groups, *M* =278.7 (SD= 59.04) for the collaborative group and *M* =257.05 (SD= 63.00) for the independent group.

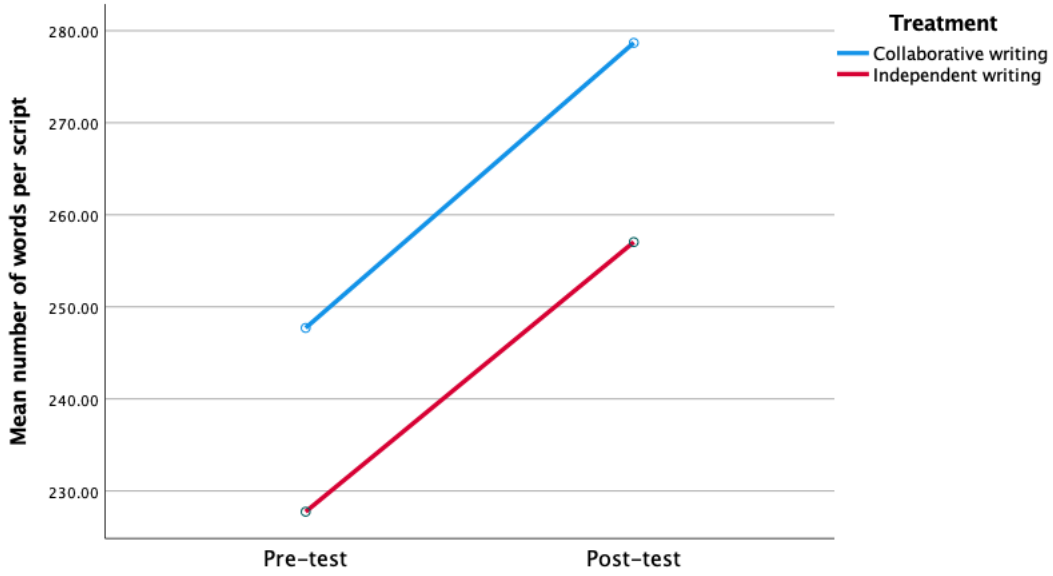

Figure 7.5- Mean number of words per text in collaborative and independent group pre and post-test writing

Words per t-unit

The mean number of words per t-unit was initially lower in the pre-test writing of students from the collaborative writing group *M* =14.87 (SD= 2.56) than the mean number of words of the independent group *M* =15.79 (SD= 3.40). However, there was a notable increase in words per t-unit in collaborative group post-test writing *M* =16.14 (SD= 2.80) and a less pronounced increase in the post-test writing of the independent group *M* =16.17 (SD= 2.89). As a result, the post-test values of both groups were similar.

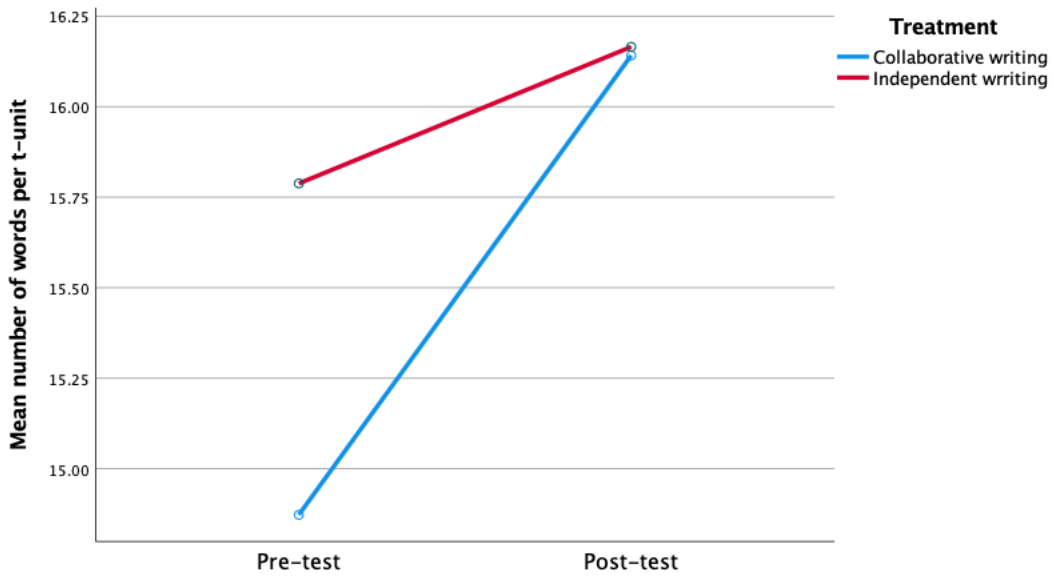

Figure 7.6 - Mean number of words per t-unit in collaborative and independent group pre and post-test writing

Words per error-free t-unit

The mean number of words per error-free t-unit was initially higher in the pre-test writing of students from the independent writing group *M* =10.61 (SD= 4.45) than the mean number of words of the collaborative group *M* =10.39 (SD= 3.99) however this situation was inversed with an increase in the mean number of words per error-free t-unit in collaborative group post-test writing *M* =12.52 (SD= 3.57) and very little change in the post-test writing of the other *M* =11.32 (SD= 5.06).

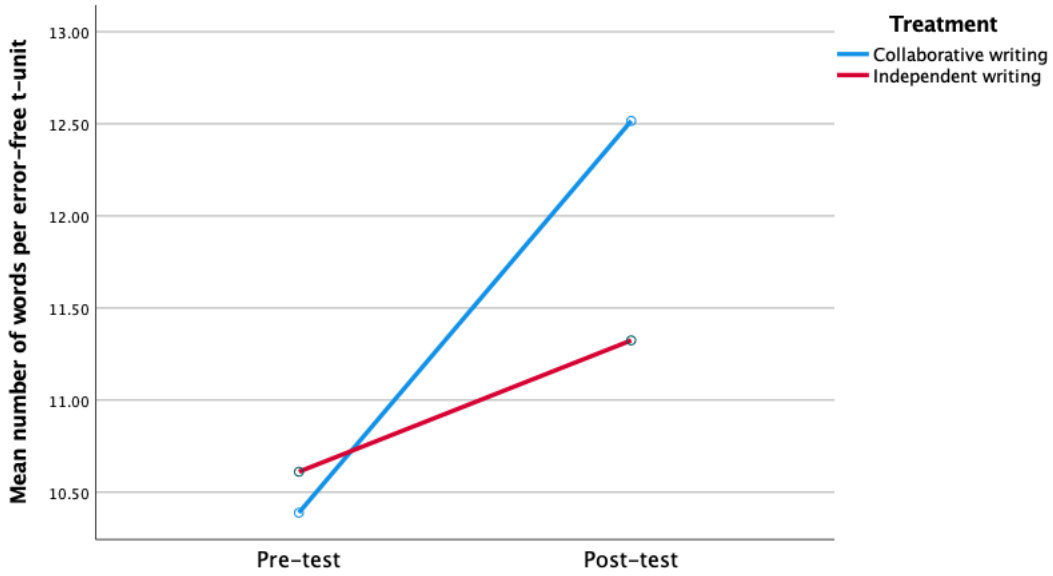

Figure 7.7 - Mean number of words per error-free t-unit in collaborative and independent group pre and post-test writing

Tests of Statistical Significance

To test the effect of completing the two different types of writing on the fluency of individual writing produced over time, a 2x2 multivariate analysis of variance (MANOVA) was used.

Multivariate (MANOVA) analysis of fluency

Using Pillai's trace, results revealed that there was a highly statistically significant main effect of **time** on the combined measures of fluency which included mean number of words per script, words per sentence and words per error-free t-unit, V=.273, $F(3, 124) = 15.55$, $p = .001$, $\eta_p^2 = .273$. This means that there was a combined increase in measures of fluency over time in the post-test measures of both groups with a large effect size (Cohen 1988, p. 285-287). These results indicate that writing appears to become more fluent over time for the participants of both groups.

Associated univariate measures of the effect of **time** on individual measures of fluency were also significant. The mean number of words per script increased significantly over time for the participants of both groups, $F(1, 126) = 28.69$, $p = .001$, $\eta_p^2 = .185$. The effect size of this is classed as large (Cohen 1988, p. 287). In the descriptive statistics section, we can also see a notable parallel increase in the mean number of words per script for both groups which is shown in Figure 7.5. Similarly, the mean number of words per t-unit increased significantly in the post-test writing of both groups, $F(1, 126) = 8.69$, $p = .004$, $\eta_p^2 = .065$. In the previous section, figure 7.6. shows that the mean number of words per t-unit increased in the post-test writing of both groups although to a lesser degree in the independent group. The mean number of words per error free t-unit also increased significantly over time for the participants of both groups, $F(1, 126) = 9.96$, $p = .002$, $\eta_p^2 = .073$.

Using Pillai's trace, results revealed that the main effect of **treatment** on the combined measures of fluency was significant, V=.065, $F(3, 124) = 2.88$ $p = .039$, $\eta_p^2 = .065$. Univariate tests of between subjects effects reveal that there was a significant main effect of **treatment** on the number of words per script, $F(1, 126) = 5.79$, $p = .018$, $\eta_p^2 = .044$, but not on the mean number of words per t-unit, $F(1, 126) = 1.16$, $p = .283$, $\eta_p^2 = .009$, or on the mean number of words per error-free t-unit, $F(1, 126) = .623$, $p = .438$, $\eta_p^2 = .005$. This tells us that if we ignore all other variables that the number of words per script of the students from the collaborative writing group was significantly different to those of the students from the independent writing group.

Using Pillai's trace, results revealed that the interaction effect between **time * treatment** on the combined dependent variables relating to the fluency of writing produced was not significant, V=.34, $F(3, 124) = 1.44$, $p = .066$, $\eta_p^2 = .034$. This result reveals that fluency in post-test writing did not increase by a significantly greater degree over time in one group more than the other.

Summary – changes in fluency

Overall, fluency in writing increased significantly over time for the participants of both groups, but did not increase to a significantly greater degree in the writing of either group.

7.2.3 Complexity

I assessed complexity in terms of two different facets of complexity which are **syntactic** and **lexical** complexity. For lexical complexity, I looked at lexical diversity which assesses the range and variety of words used and lexical sophistication which compares the percentage use of simpler, high-frequency words to the percentage of more advanced, low-frequency lexis. For syntactic complexity, I used average sentence length (measuring sentential complexity), the number and ratio of simple, compound and complex sentences per text (measuring clausal complexity) and mean length of noun phrase (measuring phrasal complexity).

Lexical complexity

Lexical diversity

The mean lexical diversity index was initially lower in the pre-test writing of students from the collaborative writing group *M* =74.48 (SD= 23.85) than the mean of the independent group *M* =79.97 (SD= 22.70). However, this situation changed with a more pronounced increase in the lexical diversity index in collaborative group post-test writing *M* =81.56 (SD= 20.34) and a less pronounced rise in the post-test writing of the independent group *M* =81.14 (SD= 18.54) which led to the similar post-test scores shown in figure 7.8 below.

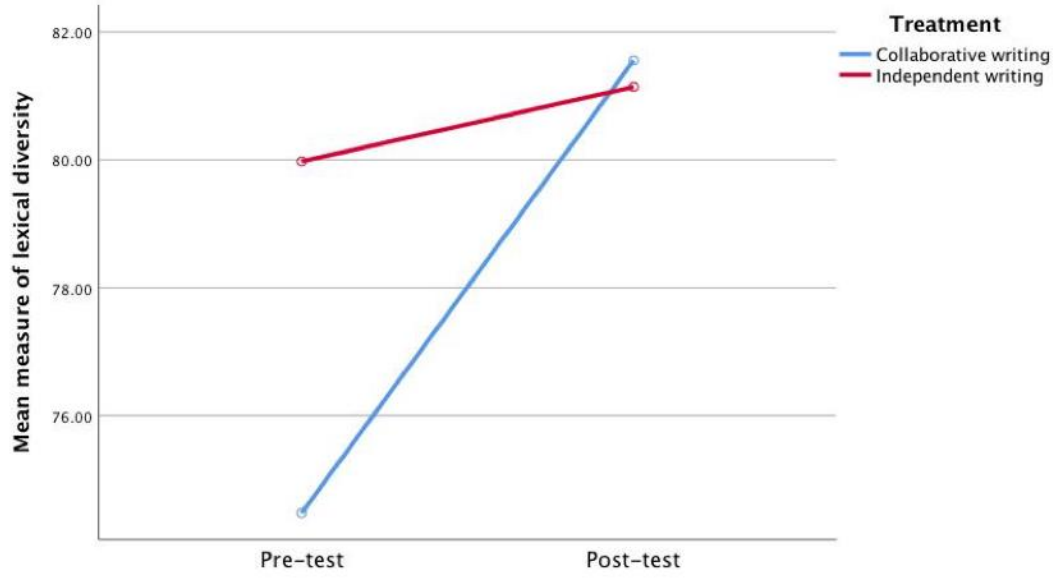

Figure 7.8- Mean lexical diversity index of collaborative and independent group writing

Lexical sophistication

A comparison of the percentage use of words from the new GSL word list reveals similar, minor changes between the use of the different word types for both groups. An overview of the changes between groups for all word categories is shown in figure 7.9 below.

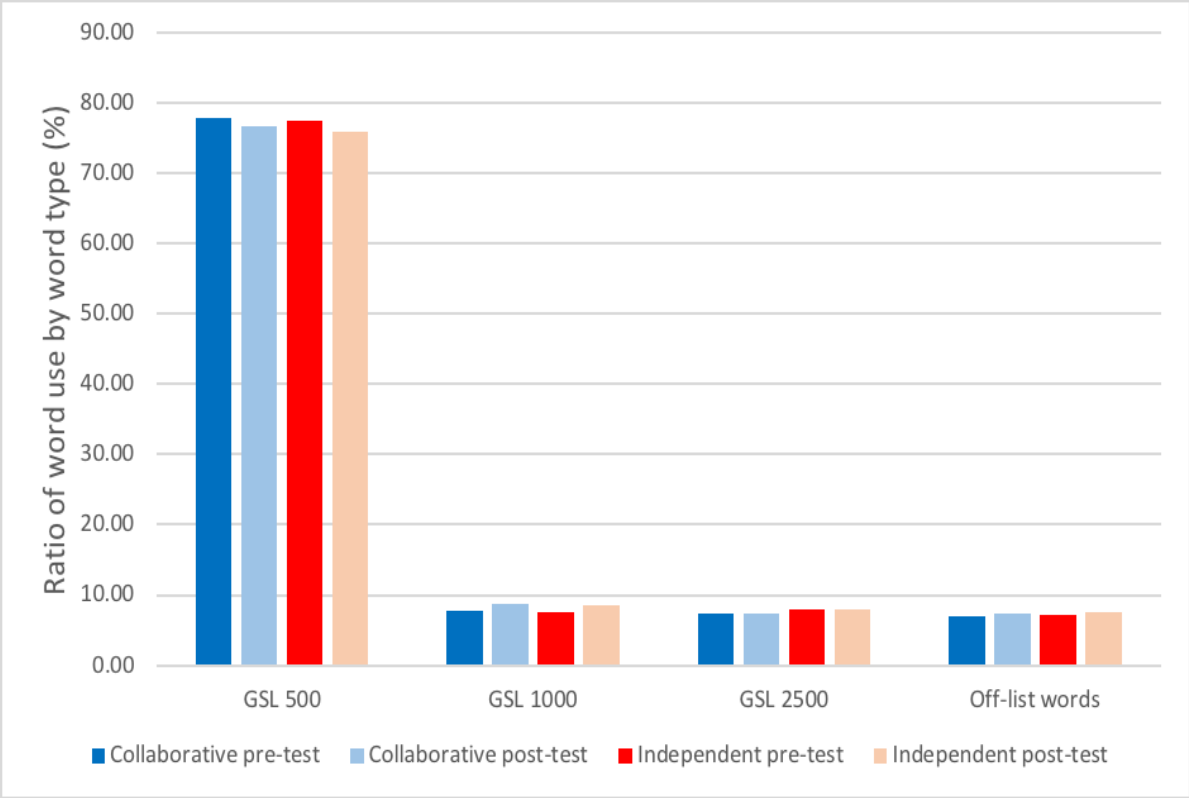

Figure 7.9- Mean ratio of words used from the GSL 500, 1000, 2500 and off-list words in collaborative and independent group pre and post-test writing

GSL 500

Looking at the changes by word group, we can observe a similar, almost parallel decrease in the use of GSL 500 words indicating a move away from more basic, high frequency words. The mean ratio use of words from the GSL 500-word group in the pre-test writing of students from the collaborative writing group *M* =77.89 (SD= 4.85) decreased in the post-test writing of this group *M* =76.62 (SD= 4.25). In a similar way, the mean ratio use of GSL 500 words in the pre-test writing of students from the independent writing group *M* =77.62 (SD= 4.39) decreased in the post-test writing of this group *M* =75.84 (SD= 4.00). The decreases in both groups can be seen in figure 7.10 overleaf.

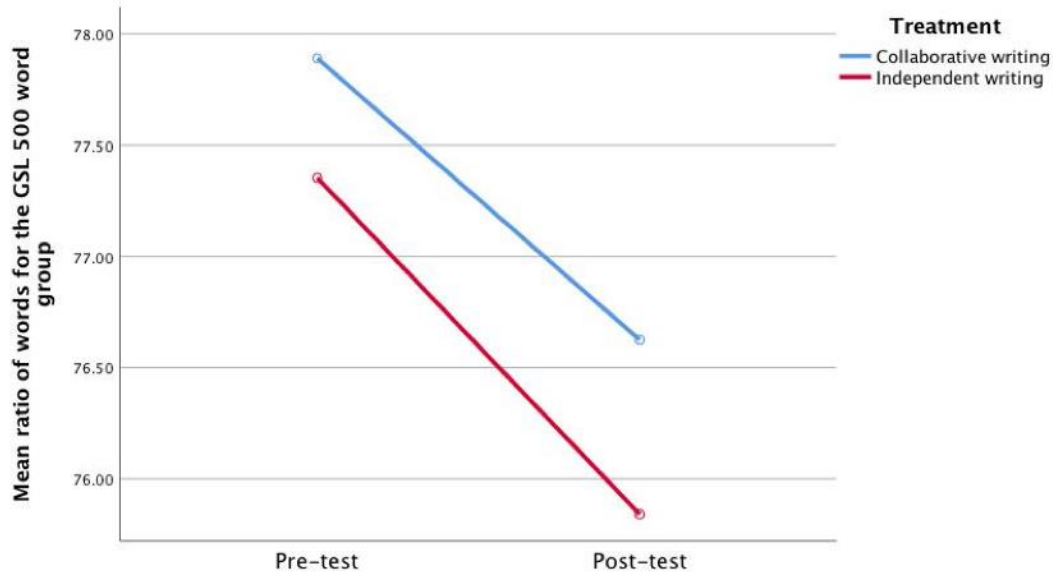

Figure 7.10- Mean ratio of words used from the GSL 500 word-group in collaborative and independent group pre and post-test writing

GSL 1000

There was an increase in use of words from the GSL 1000-word group in the post-test writing of both groups which contrasts with a decrease in the use of GSL 500 words: indicative of the use of more advanced, lower frequency lexis. As can be seen in figure 7.11, the increases in both groups are similar.

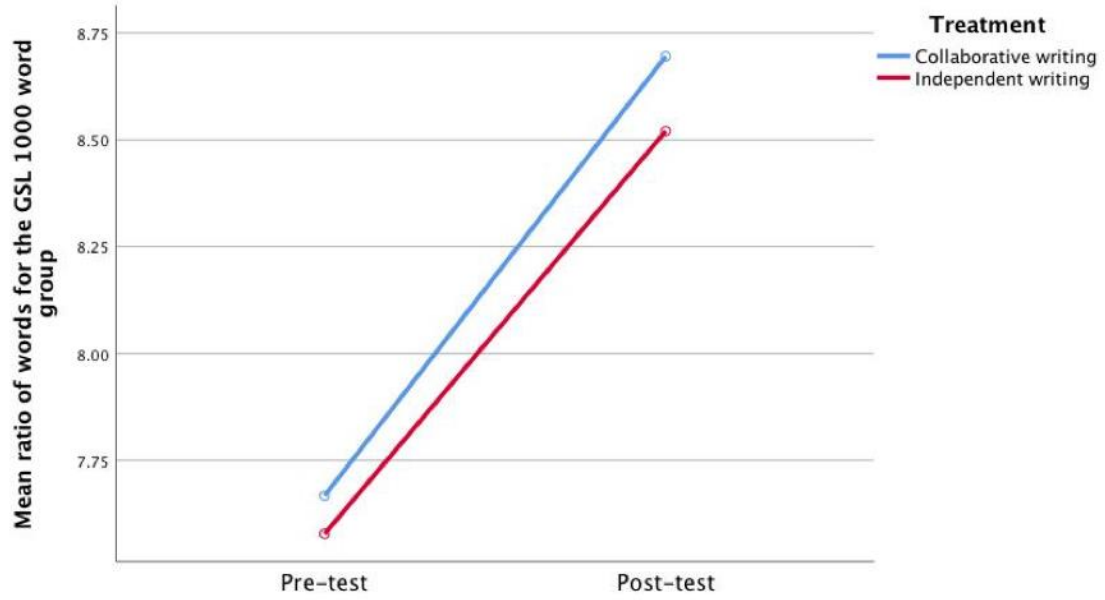

Figure 7.11- Mean ratio of words used from the GSL 1000-word group in collaborative and independent group pre and post-test writing

The mean ratio use of GSL 1000 words in the pre-test writing of students from the collaborative writing group *M* =7.67 (SD= 2.45) increased in the post-test writing of this group *M* =8.70 (SD= 2.24). In a similar way, the mean ratio use of GSL 1000 words in the pre-test writing of students from the independent writing group *M* =7.58 (SD= 2.34) increased in the post-test writing of this group *M* =8.52 (SD= 2.28).

GSL 2500

There were different changes in the use of words from the 2500-word group between the pre and post-test writing of both groups which can be seen in figure 7.12. The mean ratio use of GSL 2500 words in the pre-test writing of students from the collaborative writing group *M* =7.43 (SD= 2.26) decreased in the post-test writing of this group *M* =7.37 (SD= 1.88). Conversely, the mean ratio use of GSL 2500 words in the pre-test writing of students from the independent writing group *M* =7.91 (SD= 2.71) increased in the post-test writing of this group *M* =7.97 (SD= 1.73).

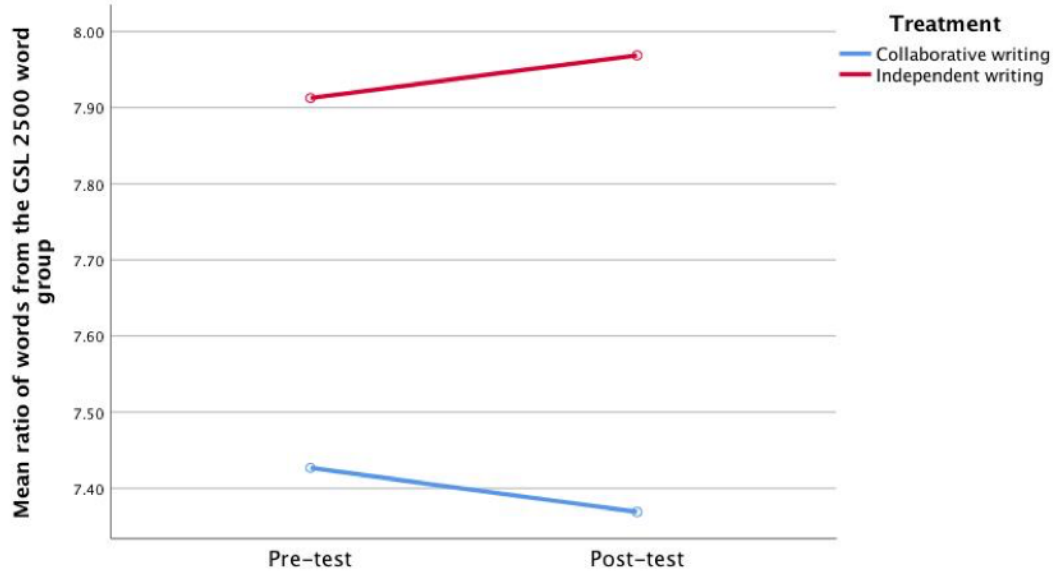

Figure 7.12- Mean ratio of words used from the GSL 2500-word group in collaborative and independent group pre and post-test writing

GSL off-list word group

There was a more pronounced increase in the use of off-list words between the pre and post-test writing of the independent writing group than between the same writing of the collaborative writing group as can be seen in figure 7.13 overleaf. The mean ratio use of GSL off-list words in the pre-test writing of students from the collaborative writing group *M* =7.02 (SD= 2.61) increased in the post-test writing of this group *M* =7.31 (SD= 2.18). However, the mean ratio

use of these words in the pre-test writing of students from the independent writing group *M* =7.16 (SD= 2.33) increased to a greater degree in the post-test writing of this group *M* =7.67 (SD= 2.30).

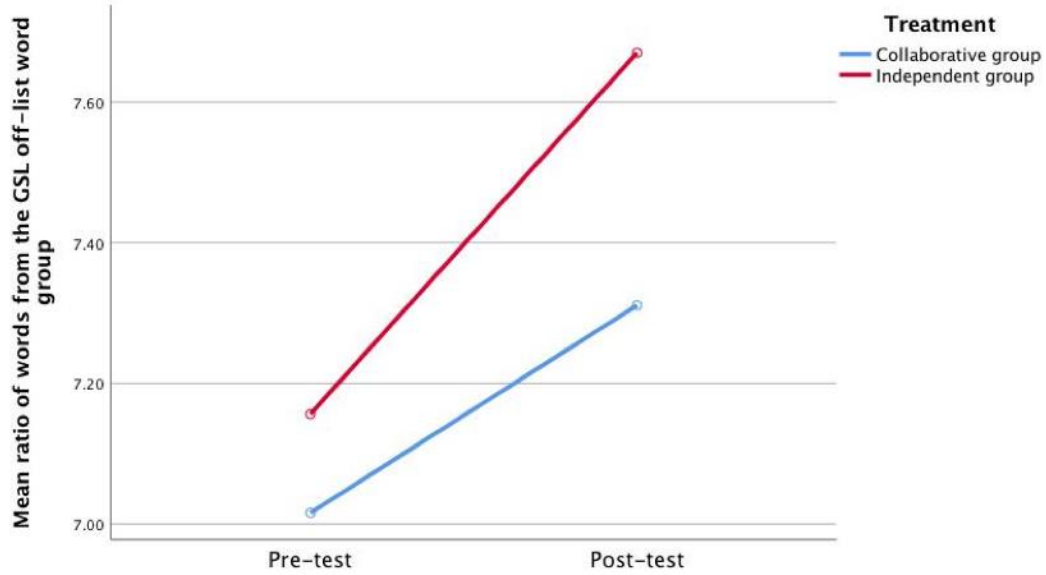

Figure 7.13- Mean ratio of words used from the GSL off-list word group in collaborative and independent group pre and post-test writing

Tests of Statistical Significance

To test the effect of completing the two different types of writing on the lexical complexity of individual writing over time, a series of 2x2 (split plot) analysis of variance (ANOVA) tests were used. Unlike the previous assessment of accuracy and fluency, analyses related to lexical complexity involved interdependent variables and as such MANOVA analysis could not be used. With this in mind, the results relating to the different individual measures of lexical complexity are outlined as it is not possible to present one overarching assessment of statistical significance as it is when a multivariate (MANOVA) test is carried out. I will first present results of the analysis of lexical diversity and then the interrelated measures of lexical sophistication. Because multiple ANOVA tests were carried out on the same data, the chance of committing a Type 1 error is increased. Pallant (2003) suggests that this can be addressed by setting a more stringent alpha value by applying a Bonferroni adjustment to control for Type 1 error (p.284). Accordingly, I have applied a Bonferroni adjustment to account for the five independent ANOVA tests used to assess lexical complexity. An adjusted alpha of .01 is used and a level of significance of $p < .01$ for each of the tests in this analysis.

ANOVA analysis of lexical diversity

There was a significant main effect of **time** on lexical diversity, $F(1, 126) = 7.33$, $p = .008$, $\eta_p^2 = .055$. This tells us that lexical diversity increased significantly over time for the participants of both groups; being that the p value is lower than the adjusted alpha previously outlined ($\alpha = .01$) and that in the previous descriptive statistics section, we could see that the index of lexical diversity increased for both groups between pre and post-test writing stages (see lexical diversity - figure 7.8).

The main effect of **treatment** was not significant, $F(1, 126) = .534$, $p = .466$, $\eta_p^2 = .004$.

The interaction effect between **time * treatment** on lexical diversity was not significant $F(1, 126) = 3.77$, $p = .054$, $\eta_p^2 = .029$. This effect tells us that there was not a significant difference between the post-test increases of lexical diversity of either group.

ANOVA analysis of lexical sophistication

The identification of word use by word group involved four separate, yet interdependent measures and as such I will outline the main effects of **time**, **treatment,** and the interaction effect of **time * treatment** on the separate measures as a group.

There was a significant main effect of **time** on the use of words from the GSL 500-word group, $F(1, 126) = 11.66$, $p = .001$, $\eta_p^2 = .081$ and on the use of words from the 1000-word group, $F(1, 126) = 13.53$, $p = .001$, $\eta_p^2 = .097$. In the previous descriptive statistics section, we have seen similar notable decreases in the use of words from the GSL 500-word group in the post-test writing of both groups (see figure 7.10) and almost identical increases in the use of GSL 1000 words between the pre and post-test writing of both (see figure 7.11). This tells us that the use of simpler, high-frequency words decreased over time in the writing of the participants of both groups and that the use of slightly more advanced GSL 1000-word group lexis increased. On the other hand, the main effect of **time** on the use of words from the 2500-word group was not significant, $F(1, 126) = .00001$, $p = .997$, $\eta_p^2 = .000$, nor was this significant on the use of words from the more advanced off-list word group, $F(1, 126) = 2.04$, $p = .156$, $\eta_p^2 = .016$. In this study, it seems that lexis from the lower spectrum of word use was affected, but that the use of higher order words was not.

The main effect of **treatment** was not significant on the use of words from any of the word groups assessed in this study; 500-word group, $F(1, 126) = .534$, $p = .466$, $\eta_p^2 = .004$; 1000-

word group, $F(1, 126) = .178$, $p = .674$, $\eta_p^2 = .001$; 2500-word group, $F(1, 126) = 3.30$, $p = .072$, $\eta_p^2 = .026$ and off-list word group, $F(1, 126) = 2.04$, $p = .156$, $\eta_p^2 = .016$.

There also was no significant interaction effect between **time * treatment** on the use of words from any of the word groups; GSL 500-word group, $F(1, 126) = 0.88$, $p = .767$, $\eta_p^2 = .001$; GSL 1000-word group, $F(1, 126) = 0.26$, $p = .873$, $\eta_p^2 = .000$; GSL 2500-word group, $F(1, 126) = 0.55$, $p = .815$, $\eta_p^2 = .000$ and the GSL off-list word group, $F(1, 126) = 0.149$, $p = .700$, $\eta_p^2 = .001$. From this, it is possible to conclude that there were no significant differences between the post-test changes in measures of lexical sophistication of either group over time.

Summary – changes in lexical complexity

There were significant increases in a number of measures of lexical complexity over time for the participants of both the collaborative and independent writing groups, but no significant differences between the increases of either. Lexical diversity increased significantly over time in the writing of both groups, but the difference between the increases of both was not significant. Similarly, the use of words from the GSL 500-word group decreased significantly in the post-test writing of the participants from both groups, but not to a significantly greater degree in either one. In addition to this, the use of more advanced GSL 1000 words increased over time, but there was not a significant difference between the increases of either group. Use of more advanced GSL 2500 and off-list words did not change significantly over time for either group.

Syntactic complexity

Average sentence length (sentential complexity)

The mean number of words per sentence was initially lower in the pre-test writing of students from the collaborative writing group *M* =18.59 (SD= 4.42) than the measure of the independent group *M* =19.67 (SD= 4.41). However, this situation changed with a more pronounced increase in the number of words in collaborative group post-test writing *M* =20.02 (SD= 4.30) and a decrease in the mean number of words per sentence in the post-test writing of the independent group *M* =19.47 (SD= 4.01) which is shown in figure 7.14 below.

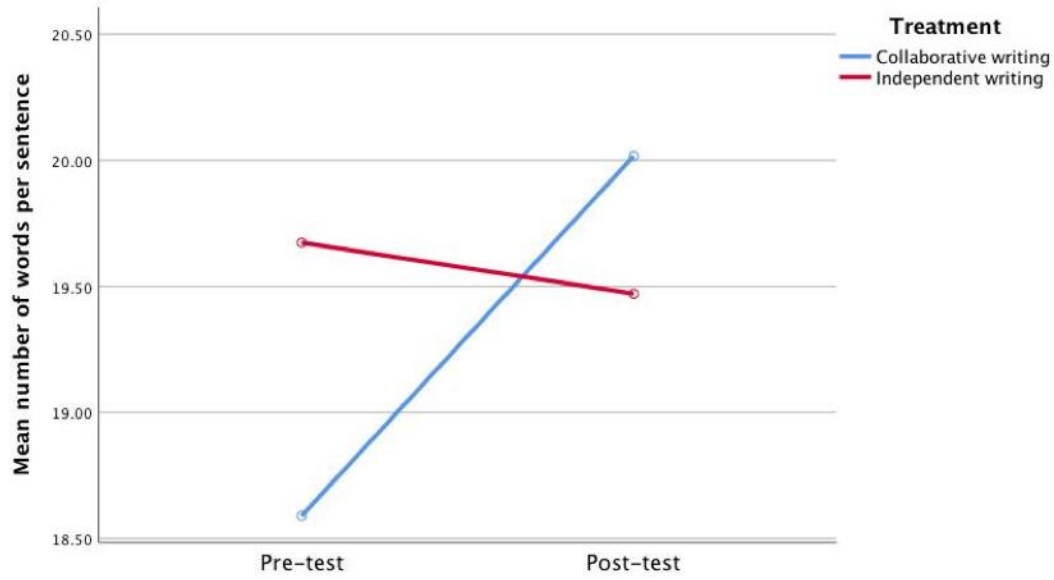

Figure 7.14- Mean number of words per sentence in collaborative and independent group pre and post-test writing

The number and ratio of simple, compound and complex sentences per text (clausal complexity)

A comparison of the percentage use of different sentence types per text shown in figure 7.15 overleaf reveals changes between the types of sentences used in the pre and post-test writing of both the collaborative and independent writing groups. It also shows the predominant use of simple sentences in all writing samples.

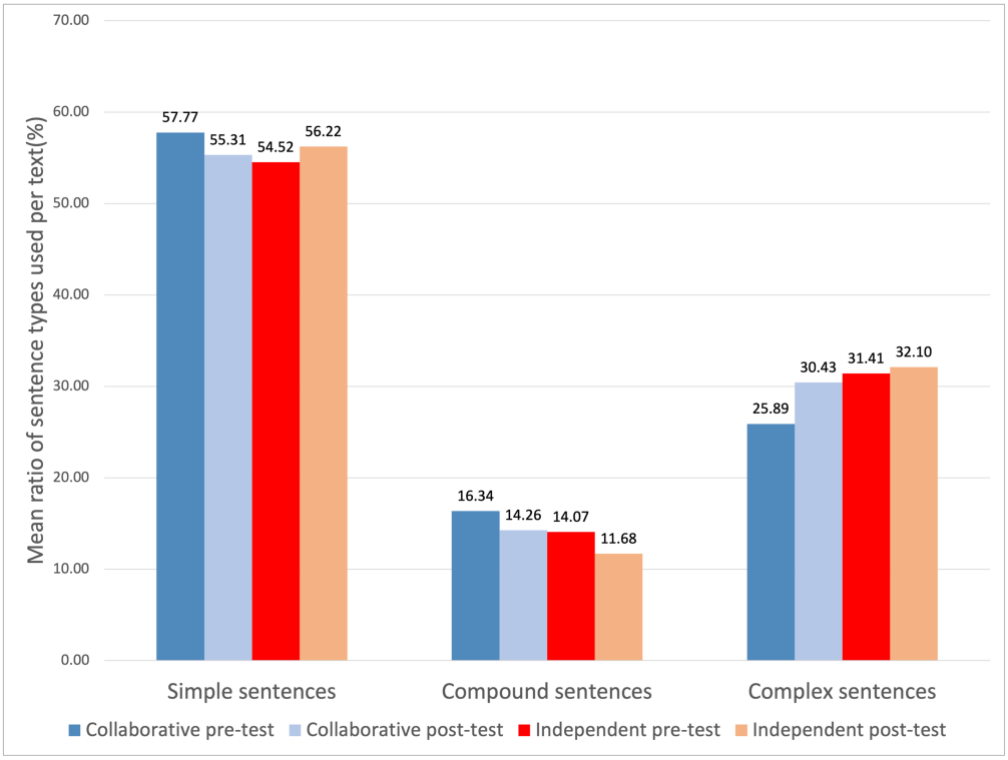

Figure 7.15- Ratio of simple, compound and complex sentences in collaborative and independent group writing

Simple sentence use

The mean ratio of simple sentences per text was initially higher in the pre-test writing of students from the collaborative writing group *M* =57.77 (SD= 17.43) than in the writing of the independent group *M* =54.52 (SD= 18.90). This decreased in the post-test writing of the collaborative group *M* =55.31 (SD= 19.44), but increased in the independent writing group *M* =56.22 (SD= 15.26) which can be seen in figure 7.16 below.

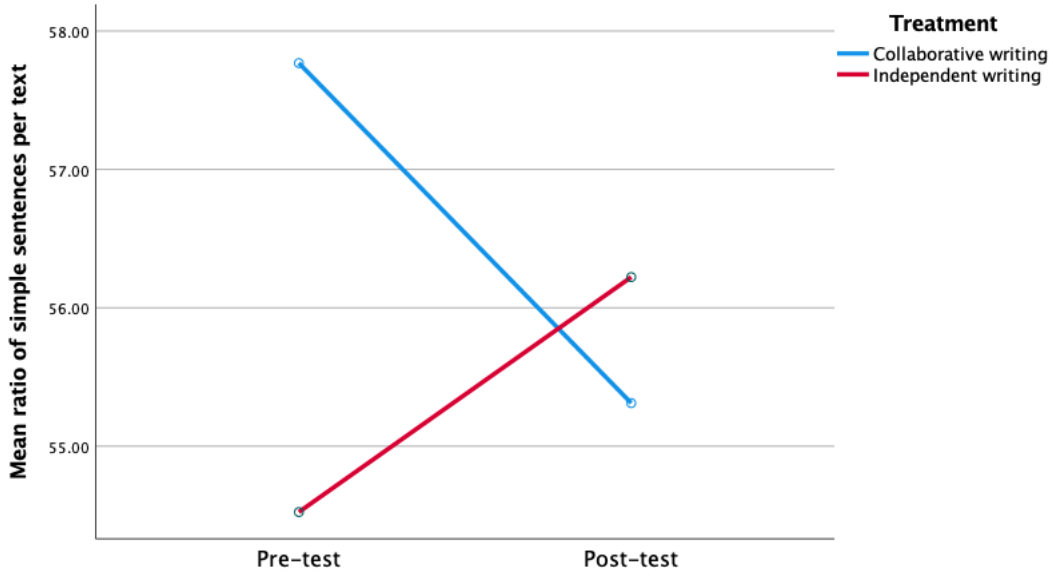

Figure 7.16- Ratio of simple sentences used in collaborative and independent group writing

Compound sentence use

Figure 7.17 shows an almost parallel decrease in the ratio of compound sentences used per text between the pre and post-test writing of both groups. The mean ratio of compound sentences per text was higher in the pre-test writing of students from the collaborative writing group *M* =16.34 (SD= 12.80) than in that of the independent group *M* =14.07 (SD= 11.96). The mean ratio dropped in the post-test writing of the collaborative group *M* =14.26 (SD= 9.35) and the independent group *M* =11.68 (SD= 10.84) by a similar margin.

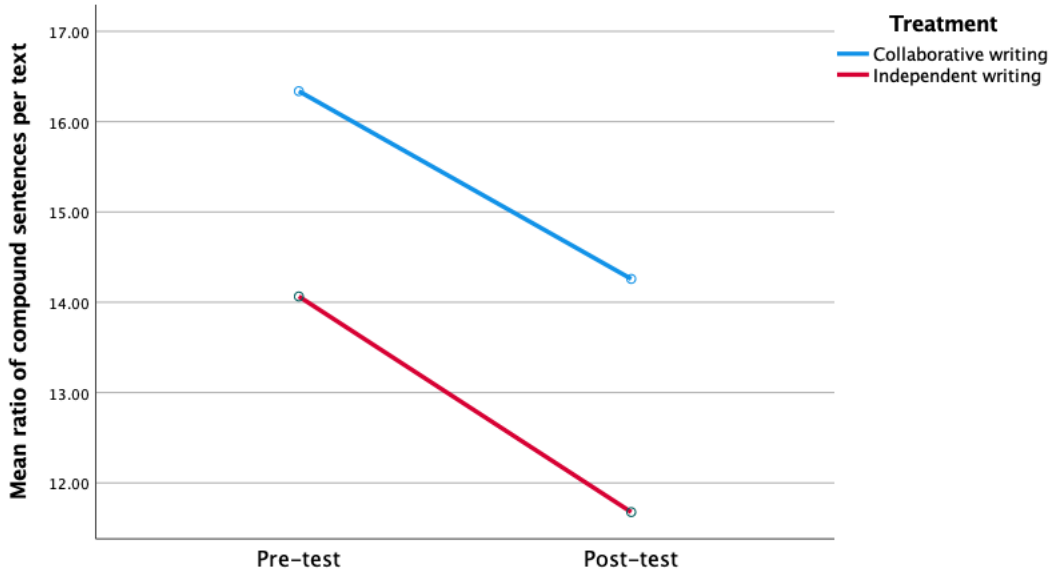

Figure 7.17- Ratio of compound sentences used in collaborative and independent group writing

Complex sentence use

There was an increase in the ratio of complex sentences used per text between the pre and post-test writing of both groups although this was more pronounced in the collaborative group as shown in figure 7.18 overleaf. The mean ratio of complex sentences per text was lower in the pre-test writing of students from the collaborative writing group *M* =25.89 (SD= 15.57) than in that of the independent group *M* =31.41 (SD= 17.62). The mean ratio increased by a slightly greater margin in the post-test writing of the collaborative group *M* =30.43 (SD= 18.74) than in the writing of the independent group *M* =32.10 (SD= 14.39) .

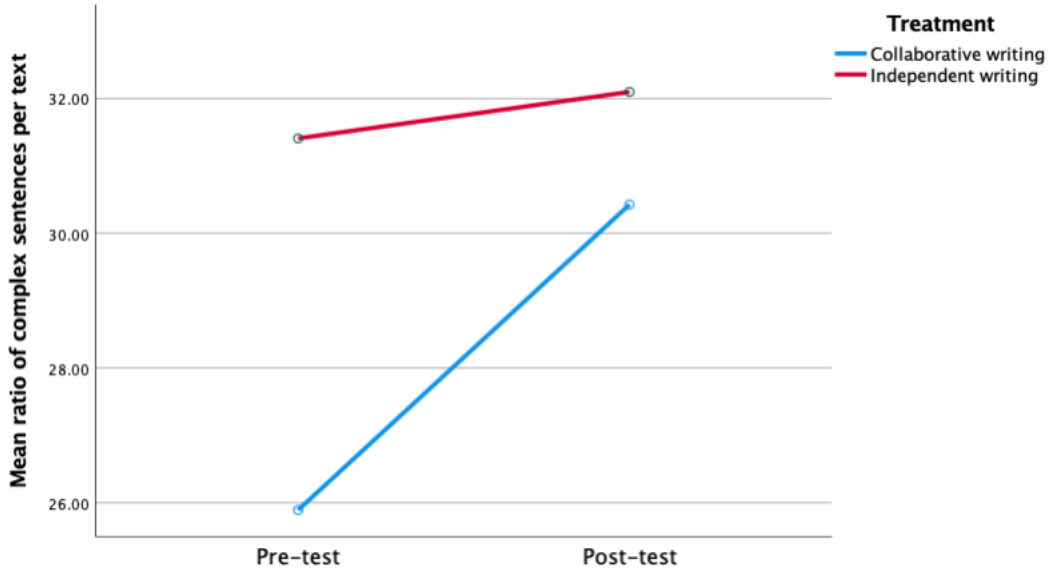

Figure 7.18- Ratio of complex sentences used in collaborative and independent group writing

Mean length of noun phrase

While figure 7.19 shows different patterns of change between the pre and post-test writing of both groups, when we look at the pre and post-test means and standard deviation we can see that there is almost no change in mean length of noun phrase in the pre and post-test writing of both groups. The mean length of noun phrase per text was almost the same in the pre-test writing of students from the collaborative writing group *M* =2.04 (SD= .064) and in post-test writing *M* =2.05 (SD= .081). Similarly, very little change is noted between the pre and post-test writing of the independent group which moved from *M* =2.04 (SD= .146) to *M* =2.02 (SD= .146) in post-test writing.

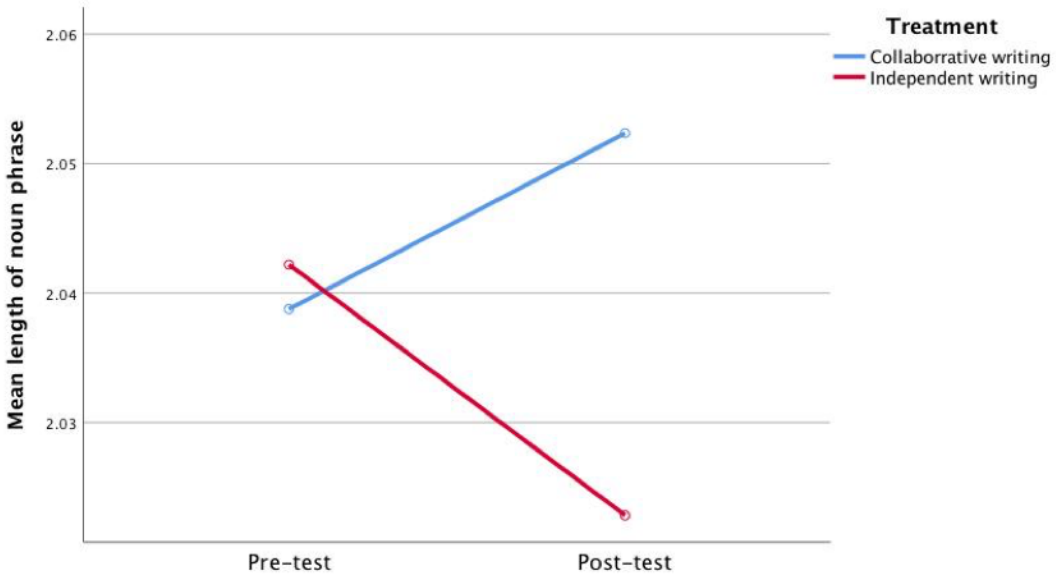

Figure 7.19- Mean length of noun phrase in collaborative and independent group writing

Tests of Statistical Significance

To test the effect of completing the two different types of writing on the syntactic complexity of individual writing over time, a series of 2x2 (split plot) analysis of variance (ANOVA) tests were used. The tests of syntactic complexity could not be grouped together in one MANOVA test because the ratio of different sentence types are interdependent which meant that MANOVA analysis could not be used. I have applied a Bonferroni adjustment to account for the five independent ANOVA tests used to assess syntactic complexity. As a result, an adjusted alpha of .01 is used and a level of significance of $p < .01$ for each of the tests in this analysis.

ANOVA analysis of the mean number of words per sentence (per text)

The main effect of **time** on the mean number of words per sentence (per text) was not significant, $F(1, 126) = 2.17$, $p = .131$, $\eta_p^2 = .018$. This tells us that if we ignore the treatment group of the participants that the mean number of words per sentence (per text) did not increase significantly over time (between pre and post-test writing).

The main effect of **treatment** also was not significant, $F(1, 126) = .174$, $p = .677$, $\eta_p^2 = .001$.

There also was not a significant interaction affect between **time * treatment** on the mean number of words per sentence $F(1, 126) = 4.10$, $p = .045$, $\eta_p^2 = .032$. The p value is above the adjusted alpha of .01 and as such the interaction effect of **time * treatment** is not significant. This effect tells us that the number of words per sentential unit did not increase to a significantly greater degree over time due to the type of writing treatment that was employed.

ANOVA analysis of the ratio of simple sentences, compound sentences, and complex sentences per text (clausal complexity)

The main effect of **time** on the ratio of different types of sentences used per text was not significant for any of the measures. For example, the ratio of simple sentences per text was not significant, $F(1, 126) = .040$, $p = .842$, $\eta_p^2 = .000$ nor was it significant for the ratio of other sentence types, such as compound sentences, $F(1, 126) = 3.04$, $p = .084$, $\eta_p^2 = .024$ and complex sentences $F(1, 126) = 1.90$, $p = .171$, $\eta_p^2 = .015$. This tells us that if we ignore the treatment group of the participants and analyze changes in the results of all participants over time that the ratio of each sentence type used did not increase or decrease significantly.

The main effect of **treatment** on the ratio of simple sentences per text also was not significant, $F(1, 126) = .215$, $p = .664$, $\eta_p^2 = .002$. Nor was the effect of treatment significant on the ratio

of other sentence types, such as compound sentences, $F(1, 126) = 2.50$, $p = .116$, $\eta_p^2 = .019$, or complex sentences, $F(1, 126) = 2.54$, $p = .114$, $\eta_p^2 = .020$.

Furthermore, the interaction affect between **time * treatment** on the use of different sentence types also was not significant, e.g. simple sentences per text, $F(1, 126) = 1.20$, $p = .276$, $\eta_p^2 = .009$; the ratio of compound sentences, $F(1, 126) = .015$, $p = .904$, $\eta_p^2 = .000$ and complex sentences, $F(1, 126) = 1.03$, $p = .313$, $\eta_p^2 = .008$. In this study, clausal complexity has not increased significantly over time and seems to be largely unaffected by the type of writing that was carried out.

ANOVA analysis of mean length of noun phrase

The main effect of **time** on the mean length of noun phrase was not significant, $F(1, 126) = 2.34$, $p = .128$, $\eta_p^2 = .018$.

The main effect of **treatment** on the mean length of noun phrase also was not significant, $F(1, 126) = 1.18$, $p = .279$, $\eta_p^2 = .009$.

Furthermore, the interaction affect between **time * treatment** on the mean length of noun phrase was not significant, $F(1, 126) = .034$, $p = .854$, $\eta_p^2 = .000$. In this study, mean length of noun phrase has not increased significantly over time and appears to be largely unaffected by the type of writing that was carried out.

Summary – changes in syntactic complexity

From the previous results, we can see that syntactic complexity did not change significantly over time nor was there a significant interaction effect **time * treatment** for any measure.

7.3 Analysis of the rhetorical development of pre and post-test writing

7.3.1 Coherence

To assess coherence in pre and post-test writing scripts, the number and ratio of sentences that needed to be reread, that were difficult to understand and that were not connected to others in the text were identified. From this identification, the remaining number and ratio of sentences that did not cause difficulty for the reader could also be established. Each sentence received a singular classification, either being classified as needing to be reread, being difficult to understand, not being connected to others, or as not causing difficulty for the reader. The number and ratio of the different sentence types was thus interdependent as a change in the ratio of one would affect the ratio of the other.

Coherence

An overview of the major changes in measures of coherence is shown in figure 7.20 below. We can see a surprising increase in the ratio of sentences that needed to be reread in independent group post-test writing, a decrease in sentences that were difficult to understand in the writing of both groups as well as increases in the ratio of sentences that did not cause difficulty. Also notable are the minimal values for sentences that were not connected to others.

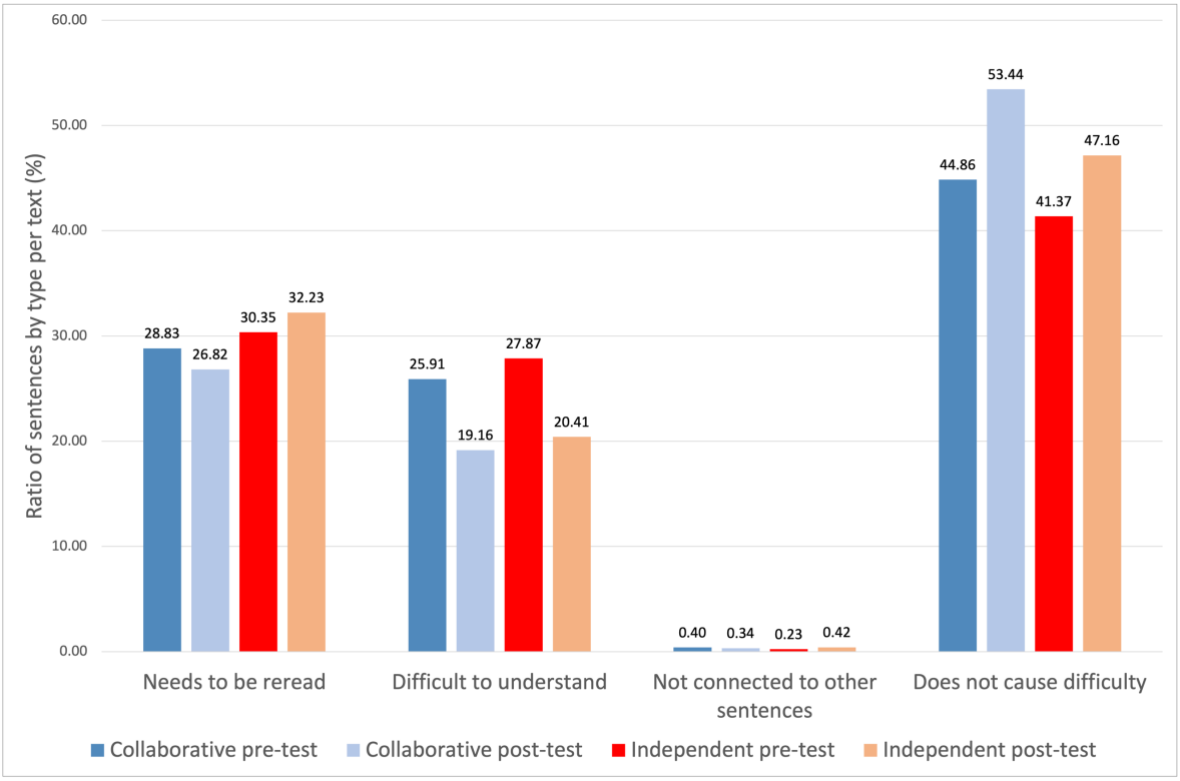

Figure 7.20 - The ratio of sentences that needed to be reread, were difficult to understand, not connected to others, or that did not cause difficulty for the reader in collaborative and independent group pre and post-test texts

Sentences that needed to be reread.

There was a lower ratio of sentences that needed to be reread in the pre-test writing of the collaborative group *M* =28.83 (SD= 13.29) and this dropped still further in the post-test writing of this group *M* =26.82 (SD= 13.05). The opposite change occurred in the independent writing group. The pre-test ratio of sentences that needed to be reread was higher than the collaborative group *M* =30.38 (SD= 15.25) and increased to be almost a third of all sentences in post-test writing *M* =32.26 (SD= 14.34).

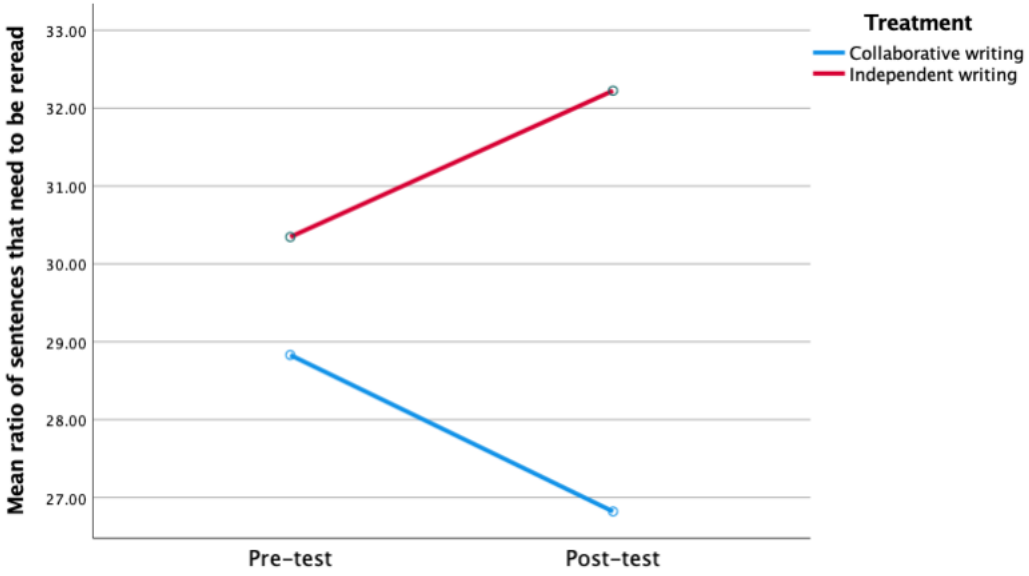

Figure 7.21- The ratio of sentences that needed to be reread in collaborative and independent group pre and post-test texts

Sentences that were difficult to understand

The ratio of sentences that were difficult to understand was lower in the pre-test writing of the collaborative group *M* =25.90 (SD= 22.19) than in the independent writing group *M* =27.87 (SD= 21.06). The post-test ratio of the collaborative group dropped to *M* =19.16 (SD= 17.05) and the independent writing post-test ratio dropped to *M* =20.41 (SD= 16.24) which can be seen in figure 7.22 overleaf.

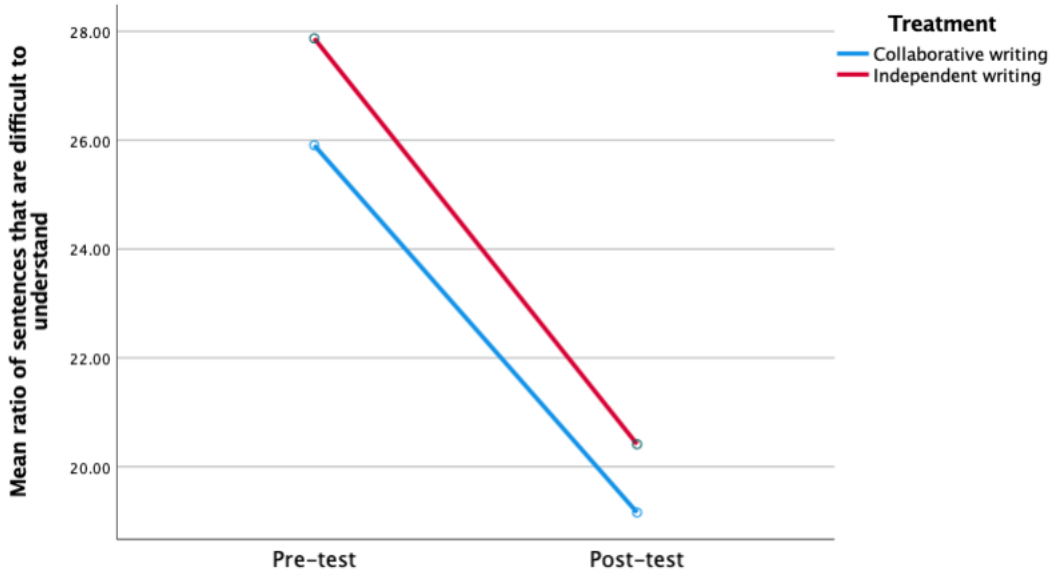

Figure 7.22- The ratio of sentences that were difficult to understand

Sentences that were not connected to others

As previously illustrated in figure 7.20, the ratio of sentences that were not connected to others accounted for less than 1% of all sentences in the pre and post-test writing of both groups. In many examples of pre and post-test writing, there were no sentences of this type. The pre and post-test changes in the ratio of sentences that were not connected to others were minimal because there were very few cases in all writing samples.

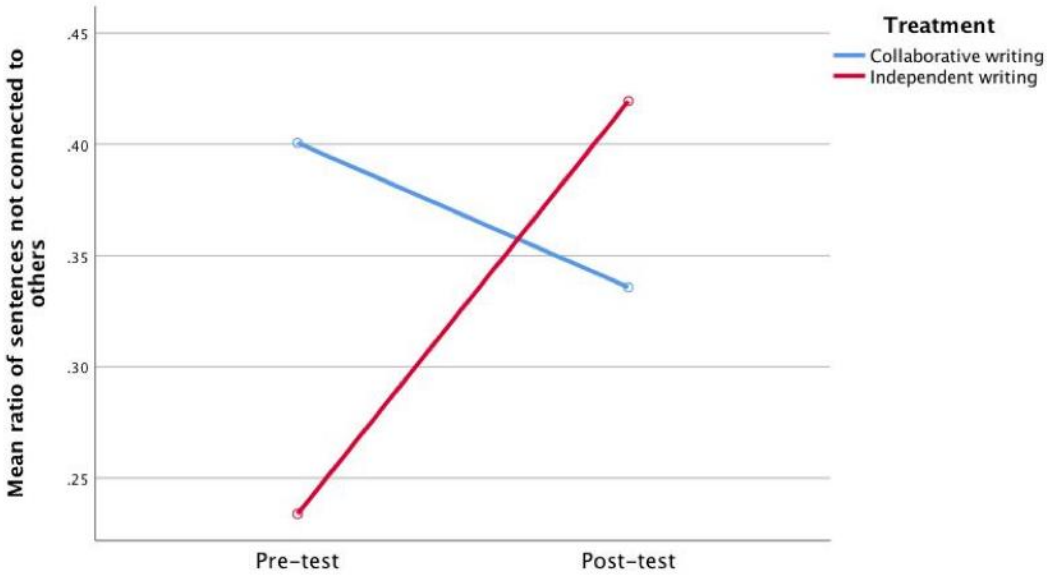

Figure 7.23- The ratio of sentences that were not connected to others

The ratio of sentences that were not connected to others in the pre-test writing of the collaborative group was *M* =.40 (SD= 1.60) and *M* =.34 (SD= 1.57) in post-test writing. The ratio of these sentences in the pre-test writing of the independent writing group was *M* =.23 (SD= 1.34) and *M* =.41 (SD= 1.67) in post-test writing. Notably, the standard deviation for the mean values is higher than the mean itself. This indicates that the ratio values for these types of sentences were not normally distributed. In many cases, there were zero values for the pre and post-test writing of both groups. Also in many cases, no notable change occurred between the pre and post-test writing of either group thus analysis of variance was not completed for this measure.

Sentences that did not cause difficulty for the reader

The ratio of sentences that did not cause difficulty for the reader increased in the post test-writing of both groups and by a slightly greater degree in the collaborative writing group. The ratio of these sentences increased from *M* =44.86 (SD= 27.21) in the pre-test writing of this group to *M* =53.44 (SD= 26.44). In the independent writing group, the pre-test mean ratio of sentences that did not cause difficulty increased from *M* =41.37 (SD= 23.70) to *M* =47.16 (SD= 22.46).

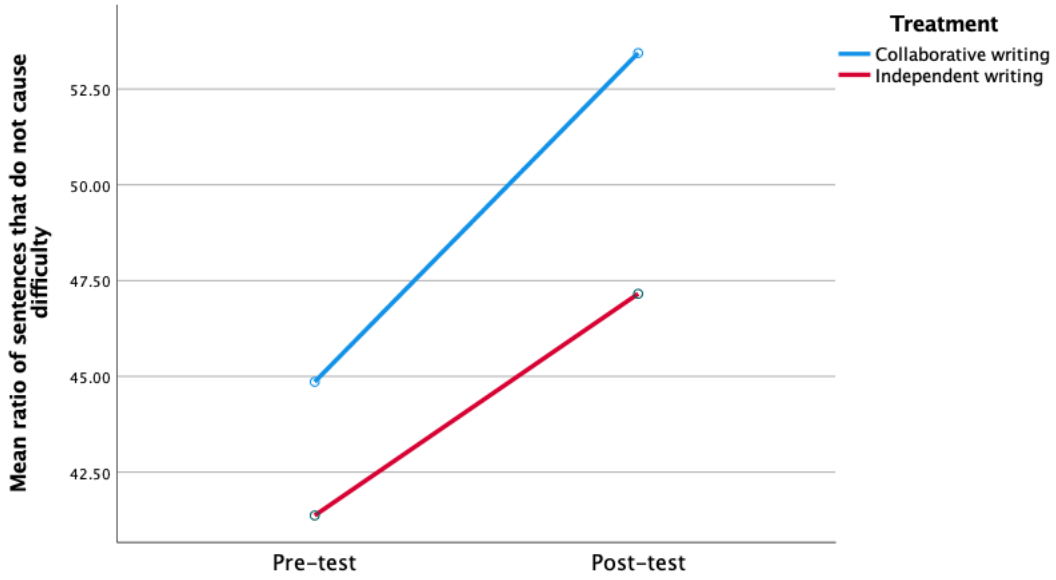

Figure 7.24- The ratio of sentences that did not cause difficultly for the reader

Tests of Statistical Significance

The ratio of sentences that needed to be reread, that were difficult to understand, that were not connected to others and that did not cause difficulty for the reader were interdependent and as a result a MANOVA test could not be used. Thus, to test the effect of completing the two

different types of writing on the coherence of individual writing over time a series of 2x2 (split plot) analysis of variance (ANOVA) tests were used. To reduce the possibility of Type 1 error associated with carrying out repeated ANOVA tests on the same data, a Bonferroni adjustment was used to account for the four independent ANOVA tests used to assess coherence in writing. An adjusted alpha of .012 was used for each test and thus the level of significance was established at p<.012. While the alpha was adjusted to account for the four different tests to be carried out, the results for the 2x2 ANOVA test on the ratio of sentences that were not connected to others in the pre and post-test writing of both groups is not shown below. In almost all cases, there were no sentences that were not connected to others in the pre and post-test writing of writers from either group thus the analysis of variance for these is meaningless. With this in mind, it is reasonable to assume that there are no significant changes for the ratio of these types of sentences between the pre and post-test writing of either group.

ANOVA analysis of sentences that needed to be reread, that were difficult to understand and that did not cause difficulty for the reader

The main effect of **time** on the ratio of sentences that needed to be reread was not significant , $F(1, 126) = .003$, $p = .959$, $\eta_p^2 = .000$. This tells us that the ratio of sentences that needed to be reread did not decrease significantly over time for the participants of both groups. However, there was a significant main effect of **time** on the ratio of sentences that were difficult to understand, $F(1, 126) = 28.71$, $p = .001$, $\eta_p^2 = .186$. In the previous descriptive section, we could see a notable decrease in the ratio of these sentences in the post-test writing of both groups (see figures 7.20 and 7.22). This means that the ratio of these sentences decreased significantly over time for the participants of both groups. Similarly, there was a significant main effect of **time** on the ratio of sentences that did not cause difficulty for the reader, $F(1, 126) = 19.74$, $p = .001$ $\eta_p^2 = .135$. Previously, we have seen that the ratio of these increased notably in the post-test writing of the collaborative and independent writing groups (see figures 7.20 and 7.24). This tells us that there was a significant increase in the ratio of sentences that did not cause difficulty over-time (from pre to post-test writing) for the writing of the participants of both groups.

The main effect of **treatment** on the ratio of sentences that needed to be reread was not significant, $F(1, 126) = 2.68$, $p = .104$, $\eta_p^2 = .021$, nor on the ratio of sentences that were difficult to understand $F(1, 126) = .262$, $p = .610$, $\eta_p^2 = .002$, or on the ratio of sentences that did not cause difficulty for the reader, $F(1, 126) = 1.41$, $p = .238$, $\eta_p^2 = .011$.

There was not a significant interaction effect between **time * treatment** on the ratio of sentences that needed to be reread, $F(1, 126) = 2.28$, $p = .134$, $\eta_p^2 = .018$, nor on the ratio of sentences that were difficult to understand, $F(1, 126) = .072$, $p = .789$, $\eta_p^2 = .001$, or on the ratio of sentences that did not cause difficulty for the reader, $F(1, 126) = .748$, $p = .389$, $\eta_p^2 = .006$. This effect tells us that the ratio of sentences that either needed to be reread, were difficult to understand, or that did not cause difficulty for the reader did not increase or decrease to a significantly greater degree in one group more than the other over time.

Summary – changes in measures of coherence

From the previous information, it is possible to conclude that certain measures of coherence changed significantly over time for the participants of both writing groups, but that there was not a significantly greater increase or decrease in these measures for the writing of either group. The ratio of sentences that were difficult to understand decreased for both writing groups over time and the ratio of sentences that did not cause difficultly increased. It seems that carrying out both types of writing over time has led to writing that is somewhat easier to understand and follow. However, the ratio of sentences that needed to be reread did not change significantly for either group, nor was the minimal ratio of sentences that were not connected to others affected.

7.3.2 Cohesion

To assess cohesion in writing, I assessed the mean number of all cohesive devices used in writing by type. In this analysis I assessed the mean number of cohesive conjunctions per 100 words (per text), the mean number of noun reference pairs per 100 words (per text) and the mean number of noun synonym pairs per 100 words (per text).

The mean number of cohesive conjunctions

The mean number of cohesive conjunctions increased in the post-test writing of both groups. This was higher in the pre-test writing of the collaborative group *M* =9.71 (SD= 2.21) than the independent group *M* =8.89 (SD= 2.16). The post-test mean of the collaborative group increased to *M* =10.26 (SD= 1.93) and to *M* =9.51 (SD= 2.23) in the independent group.

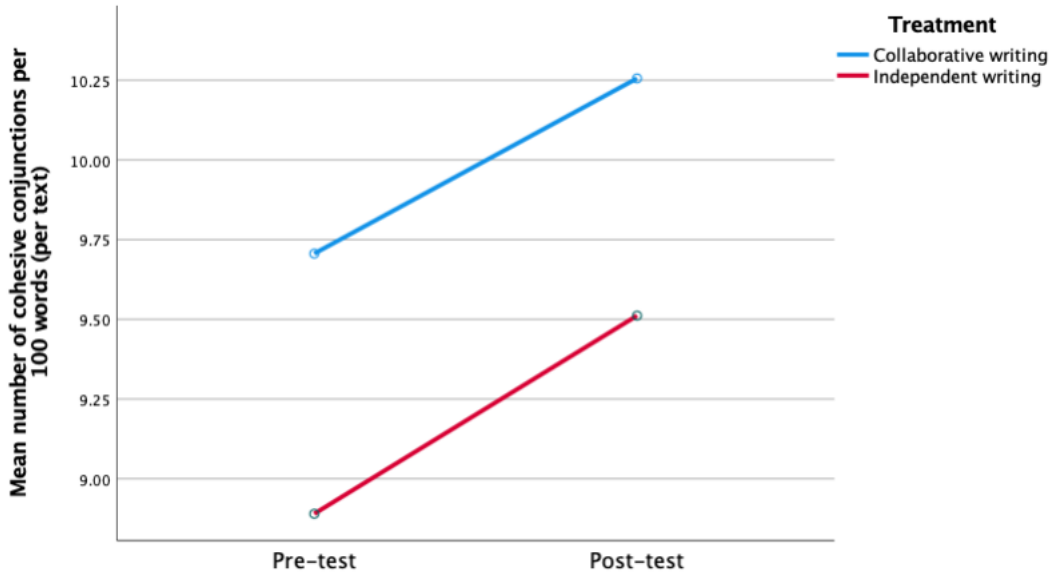

Figure 7.25- The mean number of cohesive conjunctions per 100 words in collaborative and independent group writing

Mean number of noun reference pairs

The mean number of noun reference pairs decreased in the post-test writing of both groups which can be seen in figure 7.27 overleaf. This was initially higher in the pre-test writing of the collaborative group *M* =6.98 (SD=2.51) than in the independent group *M* =6.23 (SD= 1.96). The post-test mean of the collaborative group decreased more sharply to *M* =6.27 (SD= 2.34) while the mean decrease was more moderate in the independent group *M* =5.93 (SD= 2.26).

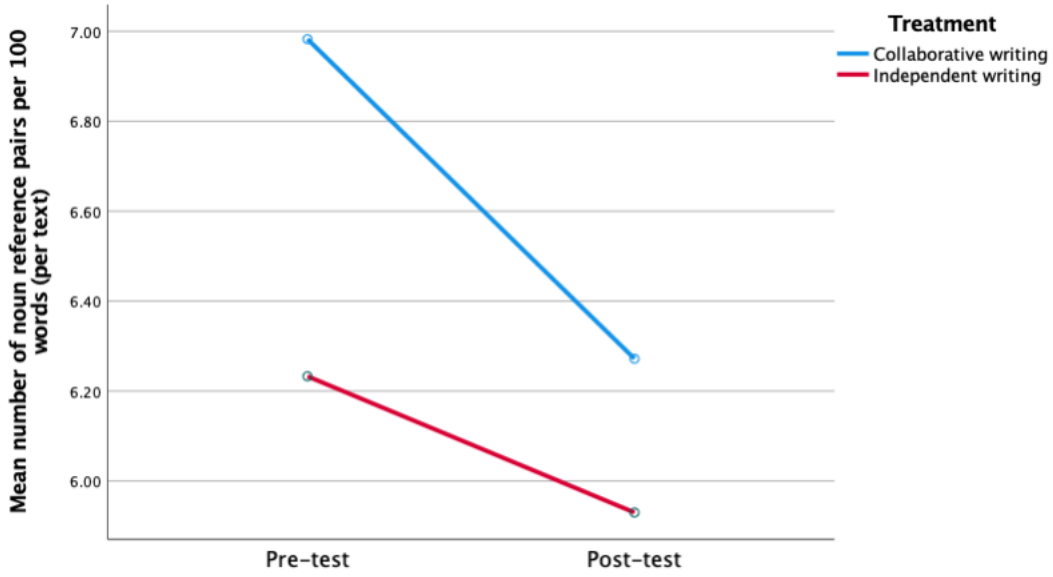

Figure 7.26- The mean number of noun reference pairs per 100 words in collaborative and independent group writing

Number of noun synonym pairs

The mean number of noun synonym pairs increased in the post-test writing of both groups. This was initially lower in the pre-test writing of the collaborative group *M* =1.58 (SD=1.00) than the independent group *M* =1.68 (SD= 1.10). The post-test mean of the collaborative group increased to *M* =1.80 (SD= 1.18) while the mean increased to *M* =1.85 (SD= 1.06).

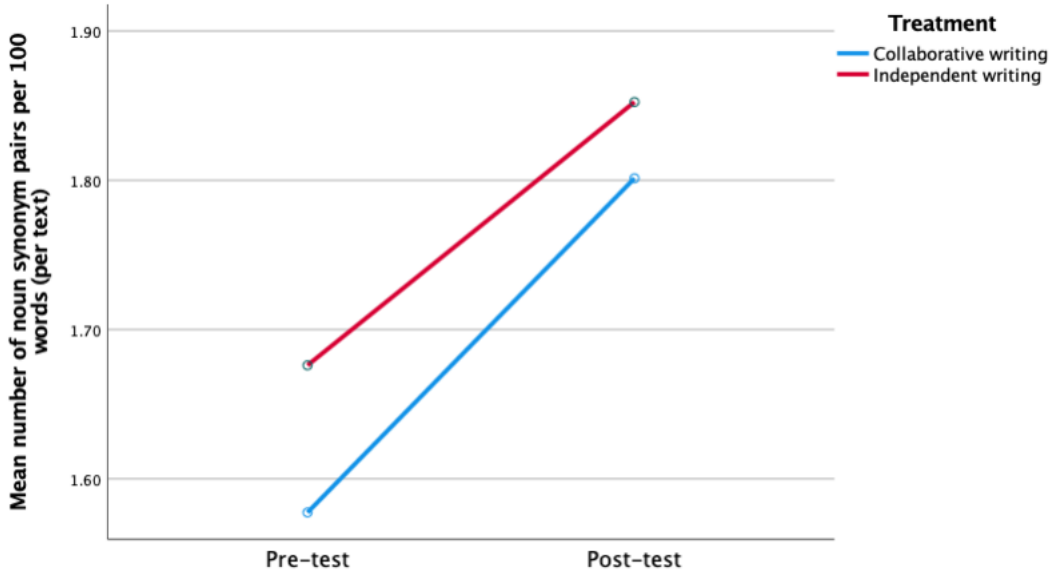

Figure 7. 27- The mean number of noun synonym pairs per 100 words in collaborative and independent group writing

Tests of Statistical Significance

To test the effect of completing two different types of writing on the cohesion of individual writing produced over time, a 2x2 multivariate analysis of variance (MANOVA) was used. The tests of statistical significance assessed the number of all cohesive devices used, such as use of cohesive conjunctions, noun reference pairs and noun synonym pairs.

Multivariate (MANOVA) analysis of cohesion and the number of cohesive devices used in text.

Using Pillai's trace, results revealed that there was a statistically significant main effect of **time** on the number of cohesive conjunctions, noun reference pairs and noun synonym pairs per 100 words used in writing, V=.075, $F(3, 124) = 3.34$, $p = .021$, $\eta_p^2 = .075$. In the previous descriptive statistics section, we can see very similar increases and decreases for all three measures over time (see figure 7.25, 7.27 and 7.29). This means that the number of cohesive devices used in writing changed significantly over time for the participants of both groups. Associated univariate tests reveal that the number of cohesive conjunctions increased significantly in the post-test writing of both groups, $F(1, 126) = 5.88$, $p = .017$, $\eta_p^2 = .045$, the number of noun reference pairs decreased significantly, $F(1, 126) = 4.72$, $p = .032$, $\eta_p^2 = .036$, but the increase in the number of noun synonym pairs for both groups over time was not significant, $F(1, 126) = 3.37$, $p = .069$, $\eta_p^2 = .026$. From the information above, we can see that there was a significant increase in the use of cohesive conjunctions and a surprising significant decrease in the number of noun reference pairs. It is possible that the significant decrease in noun reference pairs is linked to the increase in the number of noun synonym pairs, even though this increase was not statistically significant, because both cohesive devices perform a similar function.

Using Pillai's trace, results revealed that there was a significant main effect of **treatment** on the combined measures of cohesion, V=.075, $F(3, 124) = 3.24$, $p = .021$, $\eta_p^2 = .075$.

Univariate tests of between subjects effects reveal that there was a significant main effect of **treatment** on the number of cohesive conjunctions, $F(1, 126) = 7.23$, $p = .008$, $\eta_p^2 = .054$, but not on the number of noun reference pairs, $F(1, 126) = 2.77$, $p = .098$, $\eta_p^2 = .022$, or number of noun synonym pairs, $F(1, 126) = .224$, $p = .637$, $\eta_p^2 = .002$. This tells us that if we ignore all other variables, the mean number of cohesive devices per 100 words (per text) of the participants from the collaborative writing group were significantly different to those of the

participants from the independent group and specifically that the number of cohesive conjunctions in all writing samples were dissimilar.

Using Pillai's trace, results revealed that there was not a significant interaction effect between **time * treatment** on the number of cohesive conjunctions, noun reference pairs and noun synonym pairs per 100 words (per text), V=.006, $F(3, 124) = .270$, $p = .847$, $\eta_p^2 = .006$. From this we can conclude that the number of different cohesive devices did not increase or decrease by a significantly greater degree in one group than the other over time.

Summary – changes in measures of cohesion

The number of cohesive devices increased significantly for both groups over **time**, but there was no significant interaction effect between **time * treatment** on the number of cohesive devices in writing. Therefore, the number of cohesive devices did not increase or decrease to a significantly greater degree in one writing group than in the other.

7.4 Analysis of language related episodes (LREs) in collaborative writing dialogue

To assess the type of language related episodes (LREs) that occur in collaborative writing, I transcribed samples of recorded collaborative writing dialogue (n=94) and identified the number and type of each LRE. The LREs that I identified were form-focused F-LREs (relating to the use of grammar), lexical L-LREs, and mechanical M-LREs (related to the use of spelling and punctuation). These were used in previous studies carried out into the use of collaborative writing in L2 by Storch (2007), Storch and Wigglesworth (2007); Wigglesworth and Storch (2009); Dobao (2012) and Villarreal and Gil-Sarratea (2019). Additionally, I assessed discourse related D-LREs (Fortune and Thorp 2001) related to organization and cohesion in written text which were not analysed in the previously mentioned studies.

To obtain specific information related to the research questions that I asked, I also looked at M-LREs and assessed how many of these were specifically related to spelling and how many to punctuation. Additionally, I looked at D-LREs to assess how many of these were specifically related to cohesion and how many related to the organization of text. By doing this, I could find additional information without needing to create another type of LRE that had not been used in other studies.

7.4.1 Mean number and percentage of LREs in collaborative writing dialogue

Figure 7.28 overleaf shows the mean number of each type of LRE in the samples of collaborative dialogue analysed. This clearly shows that there were more lexical L-LREs than other types and that there were fewer F-LREs related to the use of grammar.

In the 94 samples of collaborative dialogue analysed, there were a total of 942 LREs and the mean number of LREs per collaborative writing dialogue was *M* =10.02 (SD=5.81). There were 95 F-LREs which accounted for 10.08% of all LREs. The mean number of F-LREs per dialogue was *M* =1.01 (SD=1.05). There were 502 L-LREs which represented 53.29% of all LREs. The mean number of L-LREs per dialogue was *M* =5.34 (SD=3.10).

There were also 158 M-LREs representing 16.77% of the total number of LREs. The mean number of M-LREs per dialogue was *M* =1.68 (SD= 1.92). Within M-LREs there were 116 M-LREs specifically related to spelling which accounted for 12.31% of all LREs. The mean number of M-LREs specifically related to spelling per dialogue was *M* =1.23 (SD= 1.58). There were also 42 M-LREs specifically related to punctuation which make up 4.46% of the total

number of LREs. The mean number of M-LREs specifically related to punctuation per dialogue was *M* =0.45 (SD= 0.97).

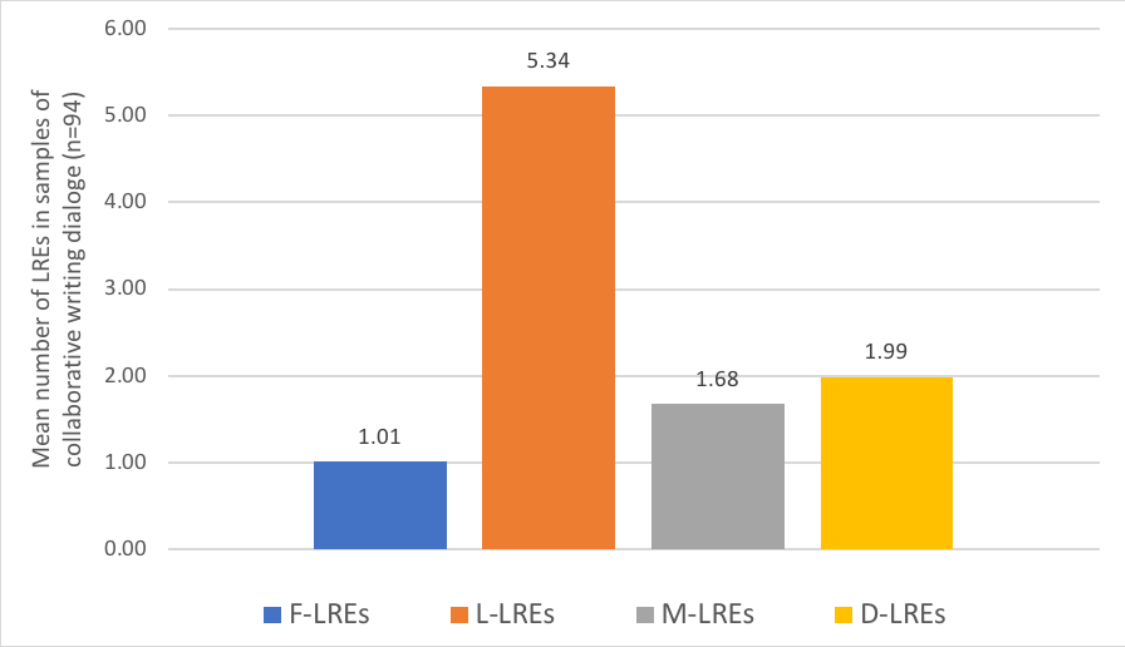

Figure 7.28– Mean number of LREs by type in 94 samples of collaborative writing dialogue

Finally, there were also 187 D-LREs representing 19.85% of the total number of LREs. The mean number of D-LREs per dialogue was *M* =1.99 (SD= 1.95). Within D-LREs there were 42 D-LREs specifically related to cohesion which accounted for 4.46% of the total number of LREs. The mean number of D-LREs specifically related to cohesion per dialogue was *M* =0.45 (SD= 0.68). There were also 145 D-LREs specifically related to the organization of text which make up 15.39% of the total number of LREs. The mean number of D-LREs specifically related to organization per dialogue was *M* =1.54 (SD= 1.82).

It is also notable that the standard deviation values are greater than the mean value for a number of LREs, such as F-LREs, M-LREs and D-LREs. This means that these values were not normally distributed. This can be clearly seen in the following section.

7.4.2 Frequency of LREs in collaborative writing dialogue.

L-LREs were more frequent in all analysed samples of collaborative writing dialogue and there were more instances of these in each. On the other hand, in a number of the samples of collaborative writing dialogue, there were no examples of D-LREs, M-LREs and F-LREs. The frequency of each type of LRE is detailed overleaf.

Frequency of F-LREs

As can be seen in figure 7.29, there were no more than 4 examples of F-LREs in the samples of collaborative writing dialogue analysed in this study. There were no F-LREs in 37 of the 94 examples of collaborative dialogue analysed; meaning that students did not engage in F-LREs in 39.36% of these. Furthermore, there was only 1 F-LRE in 30 examples of dialogue: representing 31.91%. Up to 91.5% of these had fewer than 3 F-LREs meaning that only 8.5% had 3 or more.

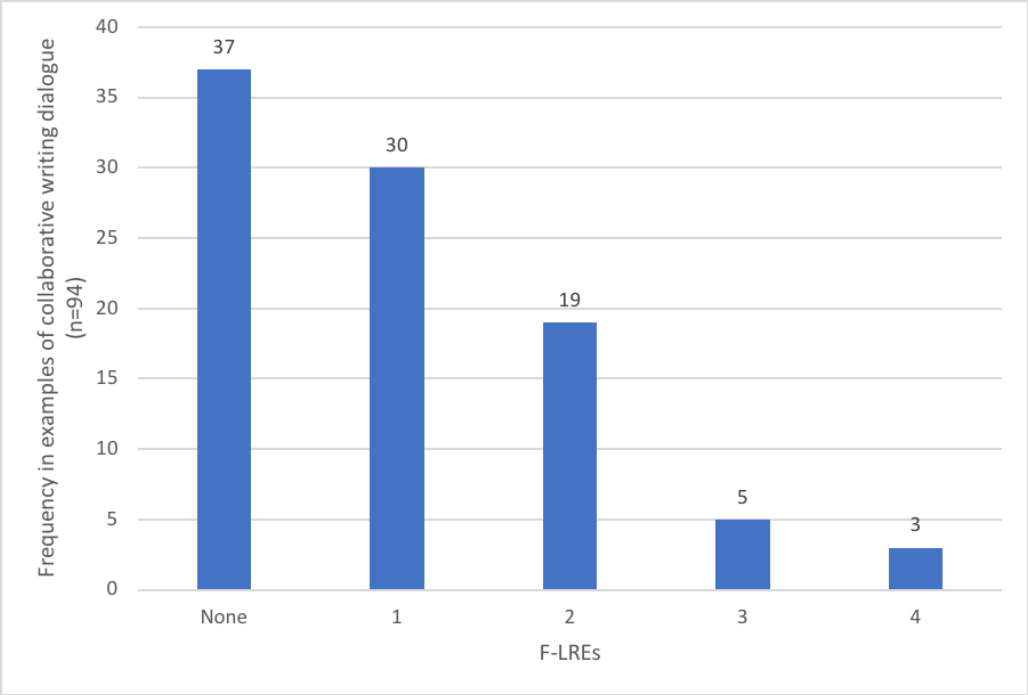

Figure 7.29– Mean number of F-LREs in all samples of analysed recorded dialogue

Frequency of M-LREs

Figure 7.30 overleaf shows that students did not discuss spelling or punctuation relating to M-LREs in 32 of the 94 examples of dialogue which represented 34.04% of all examples analysed. Additionally, in 22 examples, students engaged in M-LREs only once which was 23.4%. As with F-LREs, examples of collaborative dialogue with higher numbers of M-LREs were less frequent than those with 2 or less. For example, 77.7% of all examples of collaborative writing dialogue had fewer than 3 M-LREs meaning that only 22.3% had 3 or more.

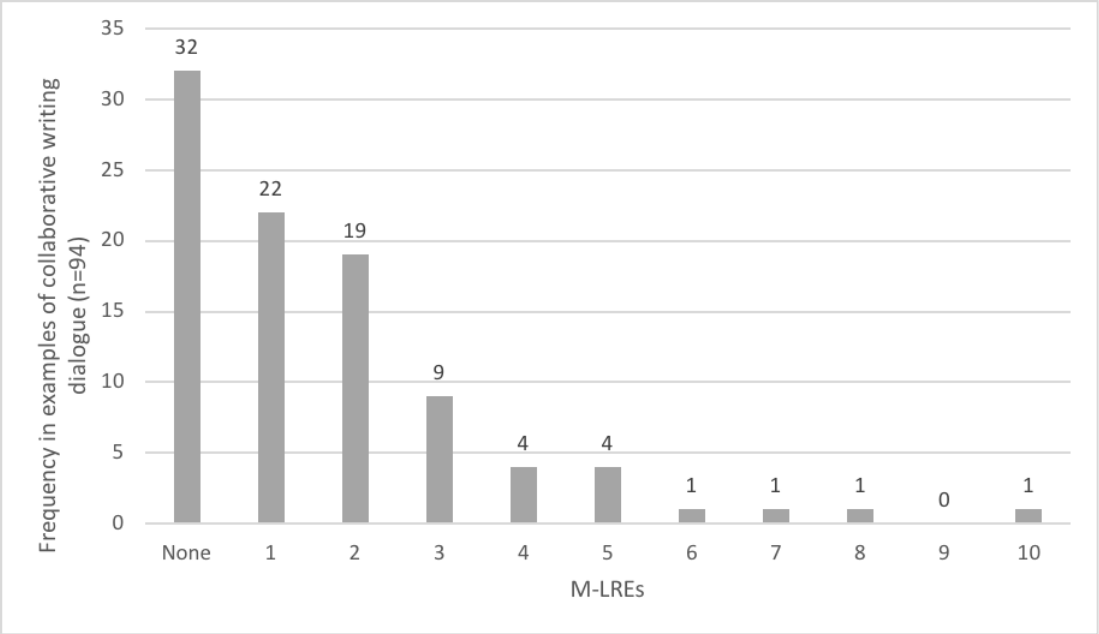

Figure 7.30– Mean number of M-LREs in all samples of analysed recorded dialogue

Frequency of D-LREs

Students did not engage in D-LREs related to the organization and cohesion of text frequently. This can be seen in figure 7.31 below. In 24 of the examples of dialogue students did not engage in D-LREs; a total of 25.53% of these. In 22 examples, learners engaged in only 1 D-LRE representing 23.4%. Lower numbers of D-LREs predominated in collaborative writing dialogue and 70.21% of all examples of dialogue had fewer than 3 D-LREs; meaning that only 29.79% of these had 3 or more.

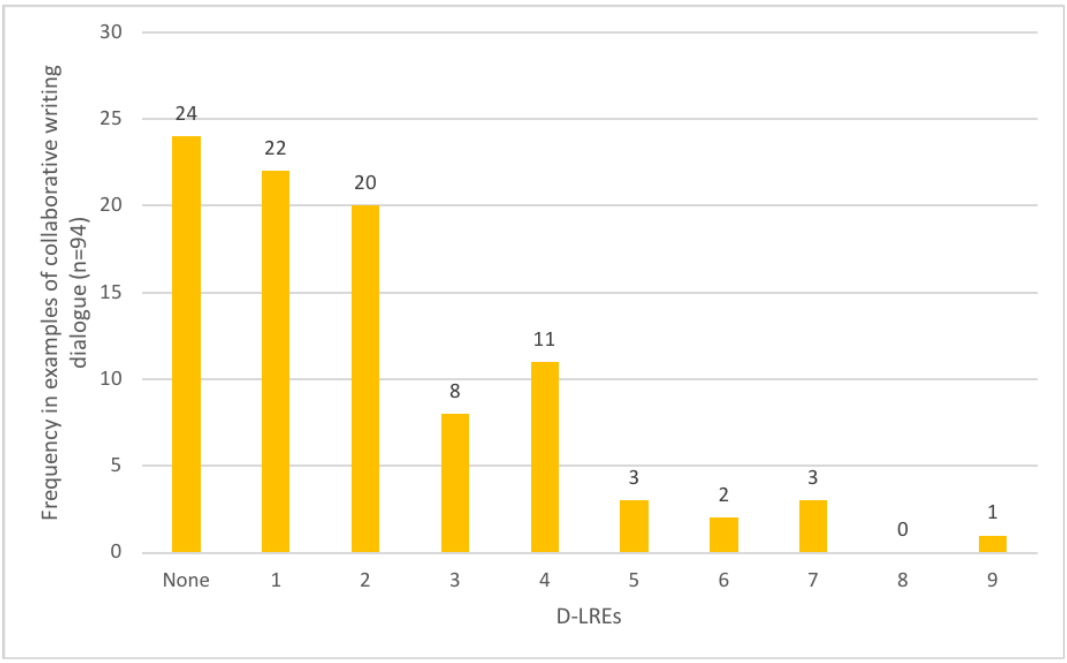

Figure 7.31– Mean number of D-LREs in all samples of analysed recorded dialogue

Frequency of L-LREs

L-LREs occurred more frequently in the analysed samples of collaborative dialogue than other LREs. The frequency of these lexical L-LREs can be seen in figure 7.32 below. We can clearly see a different pattern of frequency more aligned with normal distribution. Unlike the other LREs, there were very few examples of collaborative dialogue with no L-LREs; in only 3 of the examples of dialogue students did not engage in L-LREs; a total of 3.19% of these. Similarly, there were only 7 examples of dialogue where learners engaged in only 1 L-LRE representing 7.44%. Unlike the other LREs, there were only 16 examples where students engaged in less than 3 L-LREs which represents only 17.02% of all examples of collaborative dialogue; meaning that as much as 82.98% had 3 or more.

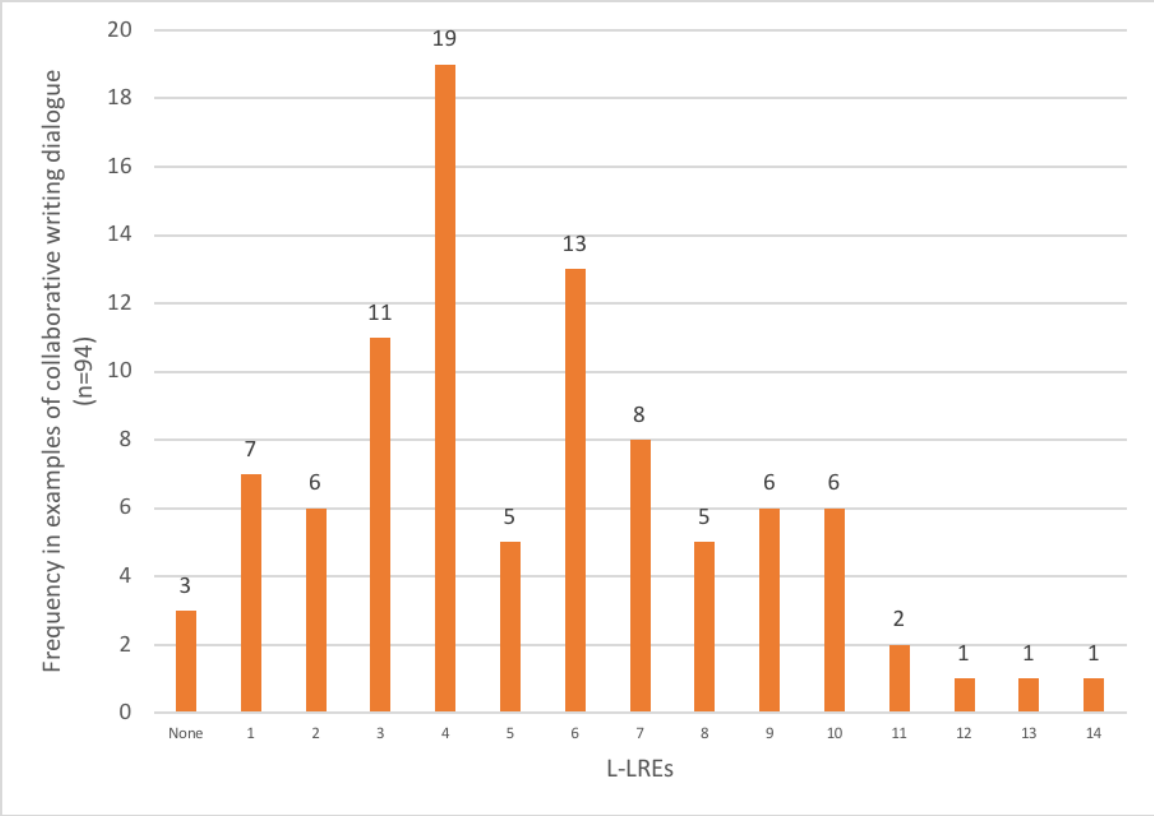

Figure 7.32– Mean number of L-LREs in all samples of analysed recorded dialogue

Summary – Language related episodes

Analysis of collaborative writing dialogue revealed that learners primarily engaged in L-LREs related to the use of lexis. Students engaged in L-LREs in almost all of the examples of collaborative dialogue analysed however there were many examples of dialogue where learners did not engage in F-LREs, M-LREs or D-LREs. Also students engaged in a greater number of L-LREs than other types. One important result that is particularly relevant to the research questions that I will address is that there were only 42 D-LREs specifically related to cohesion. These accounted for only 4.46% of the total number of LREs.

8. Discussion

The aim of this study is to look at how carrying out collaborative writing affects the individual writing that students in an English for Academic Purposes Program (EAP) subsequently produce and how this compares to how individual writing changes as a result of completing independent writing under the same conditions and over the same period of time. Bhowmik, Hilman and Roy (2019) stress that collaborative writing is currently under-used in EAP programs (p.2) possibly because the learning potential of this writing procedure has yet to be fully clarified and assessed (Dobao 2012, p.42, Storch 2013, p.169).

Scholars such as Storch (2005), Storch and Wigglesworth (2007), Wigglesworth and Storch (2009), Dobao (2012), McDonough *et al* (2018) and Villarreal and Gil-Sarratea (2019) have found that writing produced collaboratively is more accurate than writing produced independently, but Kang and Lee (2019) have suggested that it is still questionable whether learners who participate in collaborative work can perform at the same level when writing individually (p. 62) or whether their own individual writing will also improve as a result.

It is indeed possible that individual writing is not affected by collaborative writing and that the differences noted in the previous studies are simply the result of grouped performance, or two heads being better than one. It is equally possible that carrying out collaborative writing may lead to less pronounced gains in the individual writing that students subsequently produce because this reduces the amount of time that each student actually writes. For example, if fluency is achieved through writing practice and proceduralization as scholars such as Sato and Lister (2012, p.595) suggest, then will fluency develop to the same degree in collaborative writing when writing is essentially divided among two students, or when only one of the students actually writes? It is also possible that collaborative writing provides students with a very different opportunity to learn about how language is used and how ideas are presented in written discourse than those provided by independent writing which may (or may not) lead to improvement in the subsequent individual writing that they produce.

To address these issues and assess the effects of completing collaborative writing on the individual writing of students in an EAP course, I have proposed the research questions overleaf.

8.1 Research questions

Research question 1

How do accuracy, fluency and complexity change in individual writing after carrying out collaborative writing in a 10-week English for Academic Purposes course and how does this differ to how they change in the individual writing of students who completed independent writing over the same period of time?

Research question 2

Does carrying out collaborative writing affect the coherence and cohesion of individual writing that is subsequently produced and how does this differ to differences noted in the coherence and cohesion of individual writing after writing independently?

Research question 3

To what extent do learners engage in language related episodes associated with learning about language and written discourse while completing collaborative writing?

8.2 Research question 1

How do accuracy, fluency and complexity change in individual writing after carrying out collaborative writing in a 10-week English for Academic Purposes course and how does this differ to how they change in the individual writing of students who completed independent writing over the same period of time?

I will firstly summarize the results related to research question 1 then discuss these findings in relation to previous research carried out into the use of collaborative writing in L2; specifically in relation to complexity, accuracy, and fluency in writing. After this, I will discuss how carrying out collaborative writing may possibly impact linguistic development. As in previous sections, I will present the results according to the degree of change noted rather than in the order normally presented, i.e. complexity, accuracy and fluency.

8.2.1 Summary of results

Accuracy

The statistically significant interaction effect between time and treatment on the combined dependent variables relating to accuracy, V=.117, $F(4, 123) = 4.06$, $p = .004$, $\eta_p^2 = .12$, indicates that there was a significant difference in accuracy in the individual writing produced by the two treatment groups (collaborative and independent writing groups) over time. All measures of accuracy increased notably between the pre and post-test writing of the collaborative group, but there was very little change between the measures in the independent group and even decreases in accuracy in post-test writing in some cases. With this in mind, it seems that in general terms accuracy has increased to a significantly greater degree in individual writing completed after carrying out collaborative writing than after completing writing independently under the same conditions and over the same period of time.

Fluency

Overall, fluency in writing increased significantly over time for the participants of both the collaborative and independent writing groups, but did not increase to a significantly greater degree across the board for the combined measures of fluency in one group more than the other. Results revealed that there was a statistically significant main effect of **time** on the combined measures of fluency which included mean number of words per script, words per t-unit and words per error-free t-unit, V=.273, $F(3, 124) = 15.55$, $p = .001$, $\eta_p^2 = .273$, but the interaction

effect between **time * treatment** on the combined dependent variables relating to the fluency of writing produced was not significant.

Lexical complexity

There were significant increases in a number of measures of lexical complexity over **time** in the writing of the participants of both the collaborative and independent writing groups, but no significant differences between the increases of either. Lexical diversity increased significantly over time in the writing of both groups, $F(1, 126) = 7.33$, $p = .008$, $\eta_p^2 = .055$. There were also a number of significant changes in measures of lexical sophistication over time in the writing of the participants of the collaborative and independent writing groups. For example, the use of words from the more basic GSL 500-word group decreased significantly in the post-test writing of the participants from both groups, $F(1, 126) = 11.66$, $p = .001$, $\eta_p^2 = .081$ and the use of the more advanced GSL 1000 words increased over time for both, $F(1, 126) = 13.53$, $p = .001$, $\eta_p^2 = .097$. On the other hand, the use of higher-level GSL 2500-word group lexis and off-list words did not change significantly. In this study, it seems that lexis from the lower spectrum of word use was affected, but that the use of higher order words was not.

Syntactic complexity

From the previous results section, we can see that syntactic complexity did not change significantly over time, nor was there a significant interaction effect **time * treatment** for any measure for the collaborative and independent writing groups. In simple terms, syntactic complexity did not change significantly for either group over time, nor was there a significant difference between the changes of either group.

8.2.2 Summary of the answer to research question 1

Accuracy has increased to a significantly greater degree in individual writing completed after carrying out collaborative writing than after completing writing independently under the same conditions and over the same period of time. However, there were similar significant increases in fluency and significant changes in lexical complexity in the post-test writing of both groups. As previously mentioned, lexical diversity increased significantly, the use of simpler GSL 500-word use decreased and the use of slightly more advanced GSL 1000 words increased however there was no significant increase in the use of more advanced GSL 2500 and off-list words. Syntactic complexity did not increase significantly in the post-test writing of either group.

In the following section, I will discuss these findings in relation to previous research carried out into collaborative writing in L2 and highlight the parallels between the findings of both.

8.3 Links to previous research

There are a number of similarities between the results of this study and the results of previous research that looked at the differences in complexity, accuracy and fluency between writing that had been produced collaboratively or independently (i.e. studies carried out by Storch 2005; Storch and Wigglesworth 2007; Wigglesworth and Storch 2009; Dobao 2012; McDonough *et al* 2018; Villarreal and Gil-Sarratea 2019). Even though this study looked at changes in individual writing after completing either collaborative or independent writing instead of assessing the differences between writing that was produced collaboratively or independently, a number of similarities emerge.

Accuracy

Studies carried out by Storch (2005), Storch and Wigglesworth (2007), Wigglesworth and Storch (2009), Dobao (2012), McDonough *et al* (2018), Villarreal and Gil-Sarratea (2019) collectively have found that writing produced collaboratively by pairs or groups of students was found to be more accurate than work completed by one writer. However, Kang and Lee (2019) stressed that it was still questionable whether learners who participated in collaborative work could perform at the same level when writing independently (p.62); primarily because these studies did not actually demonstrate that the individual participants had learned to produce more accurate writing themselves. However, in the present study accuracy in individual writing increased to a significantly greater degree after completing collaborative writing than after completing independent writing over the same period of time.

It seems that carrying out collaborative writing can have an effect on the accuracy of the writing that is produced; both on writing that is produced collaboratively and on the subsequent individual writing of students who were involved in this writing procedure. It is possible that the interactive processes that occur as students write together allow them to produce more accurate writing and possibly to learn about how language is used which in turn may lead to increased accuracy in the individual writing that they subsequently produce. Some of the processes that may lead to these changes will be discussed in the following section (see **8.4 Collaborative writing as a writing to learn language activity**).

Fluency

With the exception of the study completed by Storch (2005), the previously mentioned studies did not find a significant difference in measures of fluency between writing that had been produced collaboratively or independently. While Storch (2005) found that pairs of students produced texts that were more succinct than those produced by individual students, Storch and Wigglesworth (2007), Wigglesworth & Storch (2009), Dobao (2012), McDonough *et al* (2018), Villarreal and Gil-Sarratea (2019) did not find significant differences between either. This study looked at changes in fluency in individual writing **after** completing either collaborative or independent writing and also found similarities between both groups however slightly different conclusions may be drawn.

When the combined measures of fluency were assessed, this increased significantly over time in the individual writing of students from both groups, but there were no significant differences in the increases of these overall. As with previous studies, there were similarities in fluency between both groups because fluency increased in individual writing in the same way after completing both writing procedures. It is possible that practicing either type of writing could lead to proceduralization or to a point where writing becomes more automatic and thus more writing can be produced (Sato and Lister 2012, p.595).

Complexity

After reviewing previous research into the use of collaborative writing in L2, it is difficult to draw any clear conclusions about the impact of collaborative writing on syntactic and lexical complexity. In the case of syntactic complexity, a number of studies found that there were no significant differences in syntactic complexity in writing that was produced collaboratively or independently, e.g. Storch and Wigglesworth (2007, p.163-165), Wigglesworth and Storch (2009, p.452) and Dobao (2012, p.49). To a certain extent, these mirror the results of the study that I carried out where there were no clear differences in how syntactic complexity developed as a result of completing either collaborative or independent writing.

However, other studies highlighted differences between writing produced collaboratively or independently although they did not seem to differ in a uniform way. For example, Storch (2005) found that the writing of pairs of students was syntactically more complex than that of individuals (p.160) however the significance of this difference was not assessed. McDonough, *et al* (2018) found that texts produced by individuals were more complex than writing texts

produced collaboratively which contrasts with the findings of the study carried out by Storch (2005). However, the study carried out by McDonough *et al* (2018) only focused on one aspect of complexity, i.e. subordination (p.116). Villarreal and Gil-Sarratea (2019) assessed syntactic complexity in individual pre-test writing produced by all students and a second writing task completed either collaboratively (by the experimental group), or individually (by the control group) and found that syntactic complexity actually decreased in the writing of the students from both groups although there was only a short period of time between when both writing tasks were carried out which may account for this unexpected change (p.7, p.14).

The only study previously mentioned that looked at lexical complexity was also carried out by Villarreal and Gil-Sarratea (2019). They found that there were no significant changes in lexical complexity between the pre and post-test writing of either group, or significant differences between the degree of change in lexical complexity from pre to post-test writing in either one (p.14). This differs to results found in the study that I carried out where there were a number of significant increases in measures of lexical complexity for both groups.

Given the mixed results in the previous research outlined above, it is difficult to draw any clear conclusions about how syntactic complexity may be affected by collaborative writing. The limited number of studies that have analysed lexical complexity also make it difficult to highlight similarities between previous research and the research that I have carried out.

The parallels between previous research and the results of this study in relation to complexity, accuracy, and fluency

From the previous comparison, we can see that there were a number of similarities between other studies into the use of collaborative writing in L2 and this research that may shed light on the effects of this interactive writing process. Firstly, it seems that accuracy is affected by collaborative writing. Writing that is produced collaboratively tends to be more accurate than writing that is produced independently and in this study individual writing that was produced after collaborative writing had been carried out was significantly more accurate than the individual writing of students who had completed independent writing under the same conditions and over the same period of time.

In most cases, no differences in fluency were noted in studies that looked at writing produced collaboratively or independently, and in this research there were similar significant increases in fluency in the individual writing of both groups. It is possible that both writing procedures

allow students to practice writing in a similar way to a point where writing becomes more automatic and fluency in individual writing increases.

On the other hand, the similarities between this study and others in relation to complexity are less clear. No clear patterns of differences in the syntactic complexity of writing that was completed independently or collaboratively were revealed which could be meaningfully compared to the results of this research. Only one of the previous studies reviewed looked at lexical complexity and the results differed to the results of the analysis that I carried out. Thus, no clear conclusions can be drawn.

Overall, a comparison of previous research and this study clearly reveals that collaborative writing may have a positive effect on the accuracy of writing produced. In the following section, I will analyze some of the possible interactive processes that occur during collaborative writing that may allow students to learn about correct language use while writing.

8.4 Collaborative writing as a writing to learn language activity

Manchón (2011) suggests that writing can be seen as a vehicle for promoting language learning and that there are characteristics of the writing process that may support or facilitate this. (p.75). Ortega (2011) suggests that writing to learn activities create new constructs, such as feedback for accuracy, feedback for acquisition and noticing during composition associated with learning (p. 240) and these processes were highlighted in the analysis of collaborative writing dialogue carried out.

From the previous results, it seems that collaborative writing is a process that is particularly conducive to learning about how language is used in writing, or about accurate language use. In previous studies, writing that was produced collaboratively was significantly more accurate than writing produced individually and in this study accuracy increased to a significantly greater degree in individual writing after completing collaborative writing than after completing independent writing under the same conditions and over the same period of time. Analysis of the processes that occurred during collaborative writing also seem to suggest that collaborative writing is a process that can allow students to learn about how language is used.

In this study, collaborative writing provided learners with a number of different opportunities to learn about correct language use which may explain why accuracy in writing increased to a significantly greater degree in the post-test writing of the collaborative writing group than in that of the independent writing group. If there is an emphasis on producing and using language

that is correct in writing, then this writing procedure seems to provide more opportunities to do so than independent writing. Analysis of collaborative writing dialogue and the LREs that students engaged in reveals that they frequently discussed correct language use. Within these episodes there are a number of processes that could potentially facilitate learning.

8.4.1 The opportunities to learn about language use in writing that collaborative writing provides

One of the main reasons for the differences in the post-test accuracy of both groups is that carrying out collaborative writing offers opportunities to learn about language use in writing that independent writing does not. Mackey, Abbuhl, and Gass (2012) suggest that there are a "constellation of features" within peer interaction that may facilitate learning (p.10). Also, scholars such as Manchón (2011, p.70) and Niu (2009, p. 396-397) suggest that writing and particularly collaborative writing are activities that allow learners to focus on form and thus provide the learner with increased opportunities to address incorrect language use. To understand how these facets may facilitate learning, it is useful to look at the possible opportunities that collaborative writing provides to the learner that are not provided by independent writing. These are outlined in the following sections.

Opportunities to receive feedback about correct language use during writing

Ortega (2011) stresses that learners can potentially receive feedback for accuracy while writing (p. 240) which was noted when analyzing the collaborative writing dialogue in this study. During collaborative writing a learner receives peer corrective feedback related to his or her use of language. This may include requests for clarification about language used in the proposals that each student makes, or even explicit indications from peers that language used was not correct. Mackey and Gass (2014) point out that through interaction learners receive feedback and information about the correctness and incorrectness of language attempts (p.183) which may prompt the learner to reevaluate and modify the language that he or she uses. In the following examples of collaborative dialogue, we can see peers highlighting problems with language use, correcting language, or even modifying language use as a result of peer feedback.

Example 8.1– One learner highlights a peer's incorrect use of grammar

S1 *We can say…* **child** in America.

S2 **Children** in America.

S1 *Yeah.* [From collaborative dialogue 34]

Example 8.2– One learner corrects a peer's use of lexis

S2 **People of obesity**, *right*?

S1 **Obese people.**

S2 **Obese people** … *okay.* [From collaborative dialogue 16]

A positive aspect of corrective feedback is that it draws the learner's attention to the incorrect language that he or she has used. Sato and Ballinger (2016) point out that corrective feedback may trigger noticing and suggest that when learners are given corrective feedback, their attention temporarily shifts to the language used when delivering their intended message (p.9-10). Another feature of peer feedback is that it also provides the learner with opportunities to modify or reformulate his or her original incorrect attempt at language and to receive peer feedback on the success of this attempt (Mackey and Gass 2014, p.183). There is a clear connection between feedback and language modification because negative feedback pushes the learner to change the language that he or she has used and positive feedback (such as confirmation or praise) allows the learner to confirm the success of this attempt (Storch 2013, p.40). This can be seen in one example of collaborative student dialogue below.

Example 8.3 - Peer-prompted language modification

S2 This issue **lower**…

S1 This issue **lowers** their self-esteem.

S2 Because…

S1 And what are we trying to say?

S2 This issue **lowers** their self-esteem… [From collaborative dialogue 74]

A learner can also receive feedback about incorrect language use and at the same time provide corrective feedback to his or her peer because each may know about different aspects of language use. This is illustrated in the example below.

Example 8.4 - Peers providing corrective feedback about different areas of language use

S2 Let's think of something… we should say there **are** a lot in common between UAE and Qatar.

S1 *Okay* there **is** a lot **of** common.

S2 A lot **in** common.

S1 **Similarities** *maybe.*

S2 ***No,*** there is a lot **in** common between UAE and Qatar…. **in,** not **of**.

S1 There **is** a lot **in** common between UAE and Qatar... okay…

[From collaborative dialogue 25]

There is little doubt that learners pool resources when they write collaboratively as suggested by Swain (2000, p.104) which can be seen in the example above, but by knowing more, or being stronger in one particular area of language use, each learner can also provide feedback to a peer that he or she can potentially learn from. The difference between collaborative writing and independent writing is that learners can receive, immediate, continuous, real-time peer feedback about errors in language use while writing collaboratively and have the opportunity to address these as and when they occur (Weigle 2002, p.18; Storch 2005 p.168). In contrast, students who complete independent writing commonly receive written feedback only after writing has been completed (Ellis 2009, p.11). This feedback is far removed from when the student makes an error (Polio, 2012, p.385) and clearly does not draw the learner's attention to problems in language use as and when they occur.

Opportunities to learn about correct language use while writing collaboratively

The language related episodes that occur while students write collaboratively provide them with the opportunity to learn about how language is used in writing. Students engage in form-focused F-LREs relating to the use of grammar, L-LREs about lexis and mechanical M-LREs about punctuation and spelling.

A number of studies have revealed that learners actively discuss language use while completing collaborative writing (e.g. Storch 2005; Storch & Wigglesworth 2007; Wigglesworth & Storch 2009; Dobao 2012; McDonough *et al* 2016), or other related collaborative activities such as text reconstruction (e.g. Fortune and Thorp 2001; Malmqvist 2005; De La Colina and Garcia Mayo 2007; Niu 2009; Basterrechea and Mayo 2013) and text editing (e.g. Storch 2007; Hanjani and Li 2014). Niu (2009) also noted that learners engaged in more LREs while completing collaborative writing activities than collaborative output speaking activities and found that collaborative writing tends to be able to draw learner attention to language forms more than oral communication alone (p.397).

Unlike independent group post-test writing, the number of grammatical, lexical and spelling errors decreased significantly in collaborative group post-test writing possibly because students had the opportunity to learn about these through discussions about language use with peers. Both learners can also discuss (and potentially learn) how language is used. During language

related episodes peers may ask and answer questions about language use, explain the use of language, or even deliberate about how it is used appropriately. Some examples of this are shown in extracts of collaborative dialogue below.

Example 8.5- Peer explanation about how grammar is used

S2 Several negative…

S1 Negativ**es**…. *No*, there are several negativ**es** effect

S2 By the way… there are a lot of negati**ve** effects… **there is no s** … he will take marks on the **s**

S1 *Really?*

S2 *Yeah*

S1 There are several negati**ve** effects of obesity [From collaborative dialogue 6]

Example 8.6– One learner explaining the meaning of a word to another student

S1 …According to… **back in the old days**, *I want to say something like that but with a better word*… **better word**?

S2 **Decades** ago …

S1 *What is* **decades**?

S2 **Decades is 10 years**, right?

S1 Yeah. [From collaborative dialogue 52]

Ortega (2011) also suggests that during writing learners can receive **feedback for acquisition** that would allow them to learn about how language is used, or about new lexis and grammatical structures (p. 240). In the previous examples, we have seen that learners can share metalinguistic knowledge about language use (Roehr 2008, p.179) or provide their partner with an explanation about why or how a certain structure is used. Herder, Berenst, de Glopper, & Koole, (2020) stress that peer discussion that occurs during collaborative writing also provides learners with a context to share knowledge with their peers (p.14) and an opportunity to learn about language use. Additionally, peers may also simply mention how language is used correctly without necessarily explaining why. This is shown in example 8.7 below, and in examples 8.8 and 8.9 overleaf.

Example 8.7– one student answers a peer's question about grammar

S2 It has, *or* it have?

S1 It **has** … yes … okay [From collaborative dialogue 31]

Example 8.8– one student answers a peer's question about lexis

S1 Because of the development **in** their countries… **in** *or* **on**?

S2 **In.** [From collaborative dialogue 11]

Example 8.9– One learner explains how to spell a word

S2 How do you spell briyani?

S1 B **I**…b-**I** -r -y -a -n -i

S2 Biryani… biryani is a … [From collaborative dialogue 10]

Peers are an additional source of information about language use and in the previous examples we have seen they can provide information about language use in a number of different ways. They not only can draw learners' attention to mistakes that they have made, but also can provide information about how language is used.

However, one problem with the peer-to-peer learning that may be facilitated by collaborative writing is that it depends upon the knowledge that both learners have. For example, one learner may not be able to answer a peer's question due to lack of knowledge, or perhaps may provide information that is not correct although this is relatively uncommon (see Pica, Lincoln-Porter, Paninos, & Linnell 1996, p.66; Yang & Zhang 2010, p.472). An example of mis-correction was noted in one of the 94 examples of collaborative writing analysed in this study:

Example 8.10– Examples of mis-correction

S1 Get **e**ffected, *or* **a**ffected?

S2 *I don't know.*

S2 *May be* **e**ffected *with* **e.**

S1 **E**ffect.. *okay.*

S1 Gets, *or* get?

S2 Gets

S1 People **gets**…?

S2 Yeah. [From collaborative dialogue 90]

This illustrates one of the problems associated with peer feedback. While rare, there is always the chance for mis-correction to occur and the feedback provided may be limited by the knowledge of language that each peer has.

Opportunities to notice how language is used in collaborative writing

Learning about language use through peer interaction in collaborative writing is not solely restricted to peer discussion about language use. Ortega (2011) points out that writing may provide opportunities for noticing during composition that can be associated with learning (p. 240) and this may be particularly true of collaborative writing. This writing process seems to increase the opportunities for the learner to notice how language is used (Manchón 2011; Niu 2009). One reason is that collaborative writing multiplies the type of language input that the learner may receive. When students make both oral and written proposals to peers about what should be included in the co-authored text, a learner has a number of different opportunities to notice how language is used by his or her peer. For example, a learner may notice how a word is used in both spoken and written proposals, possibly notice the meaning of a words from the context of what is written or said, and also has the opportunity to notice how this word is pronounced, or spelled in writing.

While writing collaboratively or independently, the learner has a number of opportunities to analyze and to reevaluate the language that he or she has used due to the pace and permanence of writing (Manchón and Williams 2016, p.572), but during collaborative writing a learner also has the opportunity to notice how language is used by his or her partner, how this differs to his or her own use of language and opportunities to discuss this with his or her peer. Peers make proposals for ideas to be included in the coauthored text either by writing down ideas and showing them to their partner or by mentioning these. Swain (2010) stresses that during peer collaborative dialogue "what is said" can become an object or artefact that can be analyzed, reviewed, and discussed (p.113). The written proposals that partners make can also be reviewed and analyzed in the same way. Collaborative writing therefore provides each learner with an additional opportunity to notice how language is used and to learn from this. The following example below and those overleaf illustrate this process.

Example 8.11– One learner noticing how lexis is used by her peer

S2 It's parsley… or some **herbs**.

S1 **What?**

S2 **Herbs**… ***it means plant leaves.***

S1 **Herbs?**

S2 Yes, **herbs.**

S1 **Herbs**... ***okay***… [From collaborative dialogue 51]

Example 8.12– One learner noticing how grammar is used by her peer

S1 Finally they both work in different types of **businesses.**

S2 Finally each country has its own type… finally each country is specialized in a certain type of **business?**… certain type of **business**?

S1 Business**es**... [From collaborative dialogue 14]

Example 8.13 - One learner noticing how a word is spelled by her peer

S2 You spelled **beliefs** wrong.

S1 Where?

S2 B-e-l-**I**-e-f.

S1 It's the same thing.

S2 **No, it's not**… lucky I saw that. [From collaborative dialogue 32]

S2 Business fiel**d**s…

S1 *This is* a **d**?

S2 *Yes.*

S1 There are so many different fiel**d**s in… [From collaborative dialogue 47]

In the first exchange, S1 notices the use of the word ***herbs***, but clearly does not know what this word means and thus asks for clarification. The noticing of this unfamiliar term has led to a request for information which allows S1 to know and to possibly learn what this word means. In the second, S1 notices that her partner uses ***businesses*** and she is possibly unsure if this is correct thus counter-proposes ***business*** to verify this and is corrected by her partner. In both cases, the learner noticed lexis she did not know, or how a grammatical structure was used from the input provided by her peer. In the third example, peers notice how words were spelled by reviewing the written proposals of their partners. The fact that learners both write down proposals and present them to their peers as well as mentioning these means that opportunities to notice how language is used are multiplied.

8.4.2 Summary

In the previous section, we have seen that collaborative writing provided learners with a number of opportunities to learn about correct language use in writing that were not provided by independent writing. This may explain why accuracy in individual writing increased to a significantly greater degree after completing collaborative writing than after completing independent writing in this study. Collaborative writing may therefore be seen as a writing to learn activity that potentially allows students to learn about correct language use as they write.

8.5 Research question 2

Does carrying out collaborative writing affect the coherence and cohesion of individual writing that is subsequently produced and how does this differ to differences noted in the coherence and cohesion of individual writing after writing independently?

I will firstly summarize the results related to research question 2 then discuss these findings in relation to previous research carried out into the use of collaborative writing in L2. After this, I will discuss how carrying out collaborative writing may impact the rhetorical features of text. As in previous sections, I will present the results relating to coherence first before outlining those related to cohesion.

8.5.1 Summary of results

Coherence

A number of measures of coherence changed significantly over time in the individual writing of students from both groups; suggesting that the individual post-test writing of students who had completed either collaborative or independent writing in a 10-week EAP course had become somewhat easier to follow and understand. There was a significant main effect of **time** on the ratio of sentences that were difficult to understand which decreased in the post-test writing of both groups, $F(1, 126) = 28.71$, $p = .001$, $\eta_p^2 = .186$. There was also a significant main effect of **time** on the ratio of sentences that did not cause difficulty for the reader which increased, $F(1, 126) = 19.74$, $p = .001$ $\eta_p^2 = .135$. There were similar changes in the post-test writing of both groups and thus the difference between the increases of either writing group was not significant. On the other hand, the ratio of sentences that needed to be reread did not decrease significantly over-time for either group, $F(1, 126) = .003$, $p = .959$, $\eta_p^2 = .000$. There were also almost no examples of sentences that were not connected to others in the pre and post-test writing of either group thus the variance of this measure was not assessed.

Cohesion

The number of cohesive devices

The number of cohesive devices used in the pre and post-test writing of both groups changed significantly over time. There were similar increases and decreases in the number of cohesive devices in the post-test writing of both the collaborative and independent writing groups thus the difference between the increases or decreases of either group was not significant. An

analysis of the combined measures of cohesion revealed that this changed significantly over time for the participants of both groups, V=.075, $F(3, 124) = 3.34$, p =.021, η_p^2 = .075. Associated univariate tests revealed that the number of cohesive conjunctions increased significantly in the post-test writing of both groups, $F(1, 126) = 5.88$, p = .017, η_p^2 = .045, the number of noun synonym pairs also increased for both but this was not significant, $F(1, 126) = 3.37$, p = .069, η_p^2 = .026, and surprisingly the number of noun reference pairs decreased significantly, $F(1, 126) = 4.72$, p = .032, η_p^2 = .036. It is possible that this decrease is connected to the increase in the number of noun synonym pairs, even though this increase was not significant, because both cohesive devices perform a similar function.

8.5.2 Summary of the answer to research question 2

From the information above, we can see that there were very similar changes in coherence and cohesion between the individual pre-test and post-test writing of students from the collaborative and independent writing groups. The post-test writing of students from the collaborative and independent writing groups seems to have become more coherent due to the significant decrease in the ratio of sentences that were difficult to understand and the corresponding increase in sentences that did not cause difficulty for the reader even though the ratio of sentences that needed to be reread did not change significantly. Cohesion in post-test writing also seems to have increased in a similar way after completing either collaborative or independent writing with significant changes in the number of cohesive devices used in the post-test writing of both groups.

In light of the previous results, it is possible to conclude that there were similar significant increases in coherence and cohesion in individual writing **after** completing both writing processes in the 10-week EAP course. However, we cannot be sure that these changes occurred **as a result of** completing the writing itself, or whether they were due to a factor common to both, such as instruction. To make a more informed interpretation of these changes, it is helpful to look at how learners discussed coherence and cohesion while writing collaboratively and whether the interactive processes that students engaged in could help them to learn about these aspects of writing. Before doing so, I will briefly review other studies into the use of collaborative writing in L2 and their possible relation to coherence and cohesion in writing.

8.5.3 Links to previous research

In the previous section, we have seen that there were parallels between other studies carried out into the use of collaborative writing in L2 and this study in relation to accuracy in writing. This comparison helped to highlight the notable effect that collaborative writing seems to have on accuracy in writing; both on writing that is produced collaboratively and on individual writing that is produced after collaborative writing has been carried out. The identification of this similarity was facilitated by the fact that similar measures were used in both groups of studies. However, it is difficult to find any parallels between previous research and this study in relation to coherence and cohesion in writing primarily because very different measures have been used to assess the rhetorical aspects of text and thus no clear conclusions can be drawn.

Different measures used to assess rhetorical aspects of text

It is difficult to draw any direct comparisons between this study that assessed coherence and cohesion in writing directly and others that looked at task content and organization. There can sometimes be similarities between these two pairs of measures, but clearly they are not the same. Another difficulty is that in general terms other studies have employed impressionistic rating using holistic rubrics rather than identifying and quantifying different features of coherence and cohesion in writing. In a meta-analysis of studies carried out into the use of collaborative writing in L2, Zhang, and Plonsky (2020) have stressed that the different studies reviewed often used different metrics which makes it difficult to compare the results across studies (p.13).

A review of previous studies that looked at how carrying out either collaborative or independent writing affected the content and organization of writing produced revealed differing results. Villarreal and Gil-Sarratea (2019) found that there were no significant differences in ratings associated with the content and organization between writing that had been produced collaboratively or independently (p.17-18). Other studies have assessed changes in individual writing after completing either collaborative or independent writing, such as those carried out by Shehadeh (2011), Khatib and Meihami (2015) and Yazdi-Amirkhiz, Ajideh & Leitner (2016). Shehadeh (2011) found significantly greater increases in the rating of content and organization in the post-test writing of students who had completed collaborative writing when compared to the same writing of students who had carried out writing independently (p.295). The same results were found by Khatib and Meihami (2015, p.208). However, in the small-scale study carried out by Yazdi-Amirkhiz, Ajideh & Leitner (2016), which was the only

study to assess coherence and cohesion directly, there were no significant changes in these measures in individual writing after completing a series of collaborative writing activities (p.12).

Given the differing results in the studies previously reviewed and that different measures were used, it is difficult to identify any parallels between previous research and the study that I have carried out that would help to clarify and interpret the significant changes in measures of coherence and cohesion noted in the post-test writing of both groups, and specifically that would help interpret changes noted in the collaborative writing group. To make a more informed interpretation and possibly clarify whether these changes were due to the writing carried out, or due to a factor common to both such as instruction, I will look at how the processes that occurred during collaborative writing could possibly have led to these changes.

8.5.4 Do students learn about coherence and cohesion through collaborative writing?

In the previous sections, we have seen that there were significant increases in measures of coherence and cohesion in individual writing after completing collaborative writing however there were also similar significant increases in these measures after students had completed independent writing. It is possible that both writing procedures have led to similar increases, but it is equally possible that the changes were simply the result of instruction. It is therefore important to analyze the processes that occur during collaborative writing that may potentially help students to learn about coherence and cohesion in writing, or in their absence may suggest that other related factors such as instruction are involved.

Coherence and collaborative writing

One of the problems of identifying discussion that could possibly be associated with coherence in collaborative writing dialogue is that coherence relates to implicit, intuitive knowledge (Philp 2009, p.194). It is learned by "feel" rather than learning rules about its use (Ellis 2006, p.434). As Lee (2002) suggests, coherence is a fuzzy concept which is difficult to teach and learn (p.135) and one which is equally challenging to conceptualize or identify. While discussion about the correct use of language (or accuracy) may be linked to the L-LREs, F-LREs and spelling related M-LREs that learners engage in, discussion about coherence cannot be associated with one particular LRE. However, in this study, I identified three different types of discussions in which students could potentially learn about coherence in writing.

Firstly, students may learn about coherence by directly discussing the meaning of what is said. They can also learn about how their ideas can be coherently expressed through discussions about how language is used. Finally, students can learn about coherence by suggesting and counter-suggesting ways in which ideas in the coauthored text can be expressed. Some examples of these discussions are outlined in the following sections.

Discussions about meaning

Storch (2013) points out that one of the advantages of collaborative writing is that it provides the writer with a ready-made "audience" that can potentially verify the coherence of this person's proposals (p.23, p.42). For example, a partner can indicate (in real-time) that a peer's proposal cannot be completely understood, or even counter-suggest ways to express this idea so that it can. However, the degree to which collaborative writing could influence how students learn about coherence in writing may be linked to the frequency of these types of exchanges. While the possibility of discussing meaning does exist, very few instances were noted in the 94 samples of collaborative writing dialogue analysed. There were only three instances where the meaning of what one partner proposed was explicitly discussed. These are shown below.

Example 8.14 – students discussing the meaning of proposals

S1 *How can we say they are **close** to each other*?
S2 **Near**… **close.**
S1 Because they are **close** to each other.
S2 *I think* … **it doesn't make sense.** [From collaborative dialogue 11]

S2 People used… **used to** [speak]… certain…
S1 Several languages.
S2 **Used to**
S1 Not **used to**…they **still do**… *let me read* …. They **speak.**
S2 Okay. [From collaborative dialogue 3]

S2 *So we can use* **diabetes** *for the* elaboration … *write* **disease.**
S1 *Even the* **heart attack.**
S2 *I don't think* **heart attack** *is a* **disease** *it comes suddenly.*
S1 **Diseases** *or* **illness**?
S2 *I don't know; both are correct* [From collaborative dialogue 77]

Discussions about the correctness of proposals

The majority of discussions were related to how ideas could be expressed coherently, or in a way in which they could be clearly understood, rather than learners deliberating about the coherence of the idea itself. These discussions focused on whether language was being used correctly to communicate the writers' intended ideas. Some examples are shown below, but there were a number of these in the examples of collaborative dialogue.

Example 8.15 – students discussing the correctness of what was said

S1 No, it's **more wealthier**… makes more sense to me.

S2 Qatar is **more wealthier**, or Qatar is more **wealthy**?

S1 Same thing.

S2 No it's **not.** [From collaborative dialogue 32]

S2 … The UAE …. The UAE citizens speak Arabic and English…

S1 Citizens speak Arabic and English **yet**…

S2 *I think* **yet** *is wrong*

S1 *Why?*

S2 *It has to be* **but**… *or* **where** *or* **whereas** [From collaborative dialogue 14]

In these exchanges, learners did not directly focus on **what** was said, but rather on **how** it was said. The feedback from partner's during these discussions could potentially help students to learn about how language can be used correctly to coherently convey the writer's message. If coherence is developed by learning how language can be used to clearly express ideas, then this is one aspect that may be facilitated by collaborative writing.

Suggesting and counter-suggesting ideas

Another way that collaborative writing may allow students to learn about coherence in writing is through the process of suggesting and counter-suggesting ideas to be included in the co-authored text. A learner may modify or add to a partner's initial proposal that cannot be fully understood to produce a message that can be agreed upon by both learners. In this way, students may learn implicitly when language use is correct when this can be understood and agreed upon by both. In the examples overleaf, we can see students suggesting and counter-suggesting ideas until reaching a final proposal that both agree upon and that can be fully understood.

Example 8. 16 – Students suggesting and counter-suggesting ideas

S2 So people …

S1 *No,* so **people can travel in short border.**

S2 *No.*

S1 *Wait…* so **it's near to each**…

S2 So **visiting each other is not a problem**.

S1 So **it's easy to visit each other**.

S2 Yeah *that's good.* [From collaborative dialogue 63]

S2 There are many…

S1 There are many **reasons** of the obesity… *no, not* **reasons.**

S2 **Causes**.

S1 **Causes** of the obesity… [From collaborative dialogue 40]

There seem to be a number of different processes that could allow students to learn about coherence in writing and thus it is possible that writing collaboratively can lead to increased coherence in the learners subsequent individual writing. While there was actually very little direct discussion about whether a partner's idea made sense, learners frequently deliberated about whether language was being used in a way that the writer's message could be understood. This may lead to an increased understanding about how ideas can be clearly and coherently expressed.

Does carrying out collaborative writing allow students to learn about coherence?

From the information above, we have seen that collaborative writing can provide students with a number of varied opportunities to learn about coherence. Although it is indeed possible that they may have learned about this through instruction, analysis of collaborative writing dialogue reveals that this interactive writing process provides students with opportunities to learn about this aspect of writing. Perhaps the most important conclusion that can be made is that there were no clear differences between how coherence in individual writing developed after completing both writing procedures in the EAP program that provided the setting for this study, with similar significant increases in measures of coherence in the post-test writing of both groups. It is therefore possible that carrying out collaborative writing in EAP programs may lead to similar changes in coherence in individual writing to those noted in student writing after completing the independent writing that is commonly carried out.

Cohesion and collaborative writing

In the previous sections, we have seen that there were significant increases in measures of cohesion in individual writing after completing collaborative writing, but this was also noted in the post-test writing of students from the independent writing group. It is therefore possible that both writing procedures have led to similar increases in cohesion in individual writing, or that this was simply the result of instruction. It is thus important to identify processes that occur during collaborative writing that could potentially have led to this change, or in their absence point to the influence of other factors such as instruction.

There were very few D-LREs related to cohesion and the majority of these were related to organization or to the positioning of elements, such as thesis statements or topic sentences within the text. Of the 187 D-LREs noted in the 94 samples of collaborative writing dialogue, 145 of these were associated with the organization of text (representing 15.39% of all LREs), but there were only 42 D-LREs specifically related to cohesion which accounted for only 4.46% of the total number of LREs. In most of these, discussion related to stylistic issues, such as avoiding the repetition of cohesive devices, rather than how the device could be used to connect ideas within the text. This can be seen in the examples below.

Example 8. 17 – Students discussing cohesion

S1 Let's say **also.**

S2 What is the first sentence?

S1 So they are close to each other … *we won't use* **addition** *now… let's write* **also** *then* **in addition** *later so we don't repeat it.* [From collaborative dialogue 27].

S1 Okay… **firstly** the main…

S2 Cause.

S1 Yeah.

S2 Is it **firstly** or **first of all?**

S1 *We can write* **firstly** or **first of all**… *it's the same.* [From collaborative dialogue 22]

Does carrying out collaborative writing allow students to learn about cohesion?

Even though cohesion increased significantly in individual writing after completing collaborative writing (as it did after independent writing was completed), there was little indication in this study that this was due to the writing process itself. Students did not engage

in frequent exchanges related to cohesion in this study, so it is also possible that this change was the result of instruction. In this study, collaborative writing also did not seem to be a process that facilitates the learning of cohesion in writing. The way writing was built up, piece by piece, does not seem to support learning about cohesion in writing which involves the connection between different parts of the text and consideration of the text as a whole. On the other hand, students did discuss the organization of text although this was not assessed in this study.

What conclusions can be drawn about the development of cohesion and coherence in individual writing after completing collaborative writing?

What can be concluded at this stage is that coherence and cohesion in individual writing developed to a similar degree in the 10-week EAP program after completing both types of writing. It is therefore possible that carrying out collaborative writing in other EAP programs instead of the independent writing that is commonly carried out could also lead to similar development in the coherence and cohesion of the individual writing that students subsequently produce. What is unclear at this stage is the degree to which the significant increases in the coherence and cohesion in the post-test writing of both groups was influenced by each writing process, or by the instruction that learners received. In the case of collaborative writing, a review of collaborative writing dialogue revealed that there were very few discussions about cohesion and indications that collaborative writing had influenced this aspect of writing. On the other hand, students engaged in a range of discussions that could potentially allow them to learn about coherence in writing however further investigation is needed to provide a more definitive answer.

8.6 Research question 3

To what extent do learners engage in language related episodes associated with learning about language and written discourse while completing collaborative writing?

I will firstly summarize the results related to research question 3, compare these to the results of previous studies and then discuss how the LREs that students engaged in while writing collaboratively could have allowed them to learn about language and written discourse.

8.6.1 Summary of results

In this study learners primarily engaged in L-LREs related to the use of lexis while writing collaboratively. Of the mean number of 10.02 LREs that learners engaged in per collaborative dialogue, 5.34 of these were L-LREs related to the use of lexis (53.29% of all LREs) while only 1.01 of these were F-LREs associated with the use of grammar which only accounted for 10.08% of all LREs. There were 1.68 M-LREs per collaborative dialogue (accounting for 16.77%), 1.23 M-LREs specifically related to spelling (representing 12.31%) and 0.45 LREs specifically related to punctuation (accounting for 4.46%). There were 1.99 D-LREs per collaborative dialogue (making up 19.85% of all LREs), only 0.45 D-LREs were specifically related to cohesion (representing just 4.46%) and 1.54 D-LREs specifically related to the organization of text (15.39% of the total number of LREs).

L-LREs were more frequent in all analysed samples of collaborative writing dialogue. On the other hand, in a number of samples of this dialogue, there were no D-LREs, M-LREs and F-LREs. There were no F-LREs in 37 of the 94 examples of collaborative dialogue analysed, no M-LREs (related to spelling or punctuation) in 32 of these, and no D-LREs (associated with cohesion and organization of text) in 24 of the 94 examples. However, students did not engage in L-LREs in only 3 of the 94 examples assessed.

A review of the samples of collaborative dialogue analysed revealed that learners actively engaged in LREs about correct language use. This included highlighting incorrect use of grammar (see Example 8.1), correcting peer use of lexis (see Example 8.2), or correcting errors in spelling in the written proposals presented by peers (see Example 8.13). Students also asked and answered questions about language use (see Examples 8.7 and 8.8), explained how grammar was used (see Example 8.5) and how words were spelled correctly (see Example 8.9). Discussion about written discourse primarily related to the organization of text (see Examples 4.2, 4.6) and there were very few D-LREs related to cohesion.

8.6.2 Analysis of LREs in collaborative writing in other studies

It is difficult to draw any parallels between previous research carried out in relation to LREs and their potential impact on learning because a number of studies into the use of collaborative writing have not analysed this (e.g. Shehadeh 2011; Khatib and Meihami 2015; Yazdi-Amirkhiz, Ajideh & Leitner 2016), or they have focused on episodes that were not directly comparable to those identified in this study, such as episodes related to content (e.g. Neumann and McDonough 2015, p.90; McDonough *et al* 2016, p. 196; McDonough *et al* 2018, p. 113). However, previously cited studies carried out by Storch and Wigglesworth (2007), Wigglesworth and Storch (2009), Dobao (2012) and Villarreal and Gil-Sarratea (2019) looked at the number of L-LREs, F-LREs and M-LREs that are identified in this research although they did not identify discourse related D-LREs.

Storch and Wigglesworth (2007, p.167) found that students primarily engaged in L-LREs (accounting for over 50% of all LREs), slightly fewer F-LREs (approximately 40%) and a limited number of M-LREs (approximately 10% of all LREs). Similar percentages were reported by these scholars in a later study (Wigglesworth and Storch 2009, p.456). Dobao (2012, p.50) found that students working in groups primarily engaged in F-LREs (47.51%), followed by L-LREs (45.65%) and in a limited number of M-LREs (7.20%) while pairs of students engaged in more L-LREs (48.51%) followed by F-LREs (48.12%) and then by M-LREs (3.37%). More recently, Villarreal and Gil-Sarratea (2019) found that students engaged in 44.93% of F-LREs, 42.02% of L-LREs and 13.04% of M-LREs (p.10).

In the study that I carried out, L-LREs accounted for 53.29% of all LREs which is similar to the studies mentioned above. However, in this study students engaged in more M-LREs (e.g. 16.77%) than in the studies cited. Surprisingly, learners engaged in far fewer F-LREs in the present study than in the studies outlined above (representing only 10.08% of all LREs).

8.6.3 Summary of the answer to research question 3

In this study, students engaged in language related episodes associated with learning about correct language use which may partially explain the significant increases in accuracy in collaborative group post-test writing. In relation to written discourse, students primarily engaged in D-LREs related to the organization of text which was not assessed in this study and in very few D-LREs related to cohesion. These findings are discussed in the following sections.

8.6.4 LREs associated with learning language

Previously we have seen that students engaged in F-LREs related to the use of grammar, L-LREs associated with lexis and M-LREs related to spelling although students engaged in more L-LREs in each example of collaborative writing dialogue and there were very few examples of collaborative writing dialogue where students did not engage in L-LREs. The language related LREs that learners engaged in primarily focused on correct language use which may partially explain the significant increases in accuracy in collaborative group post-test writing. However, students engaged in a relatively small number of F-LREs (as compared to other studies carried out by Storch and Wigglesworth 2007, p.167; Wigglesworth and Storch 2009, p.456; Dobao 2012, p.50; Villarreal and Gil-Sarratea 2019, p.10) and thus we may expect less pronounced increases in grammatical accuracy, but in fact the number of lexical, grammatical, and spelling errors decreased in a similar way. This suggests that other less readily identifiable interactive processes, such as noticing, could also have led to this change.

The relationship between language related LREs and other aspects of linguistic development, such as complexity and fluency is slightly more difficult to determine. There is no apparent connection between LREs and fluency although the process of writing collaboratively and engaging in discussion about all aspects of the writing process may lead to increased knowledge about how writing is produced and in turn to increases in fluency in the learner's own writing. In relation to complexity, there could potentially be a relationship between the frequency of L-LREs and the development of lexical complexity in individual writing. For example, students frequently engaged in L-LREs that may have allowed them to produce writing that was lexically more complex. However, analysis of other LREs, such as F-LREs, did not reveal any clear evidence of students discussing issues relating to syntactic complexity, such as the use of complex sentential structures which may explain why syntactic complexity did not change significantly.

On the other hand, we cannot be completely sure at this stage that the changes in lexical complexity mentioned above were specifically due to the process of writing collaboratively because the same changes in lexical complexity were found in the post-test writing of students from the independent writing group. It is therefore also possible that changes occurred due to the instruction that was common to both writing procedures and not because of the writing process itself.

8.6.5 LREs associated with written discourse

As previously mentioned, students engaged in more D-LREs related to the organization of text than D-LREs associated with cohesion. The limited number of cohesion-related D-LREs that students engaged in primarily focused on stylistic issues instead of how cohesive devices could be used to connect ideas within the text (see Example 8.18). I initially envisioned that students would engage in more D-LREs related to cohesion, but the way the coauthored collaborative writing text was built up, piece by piece, did not seem to support learning about cohesion in writing which involves the connection between different parts of the text and consideration of the text as a whole. This does not mean that students cannot potentially learn about cohesion through writing collaboratively, but rather that there was little evidence of this in this study. Even though there were significant increases in cohesion after completing collaborative writing (as there were after completing independent writing), the limited number of D-LREs that students engaged in that were directly related to cohesion suggests that this change was more likely due to instruction rather than the writing process itself.

Perhaps surprisingly, there were notably more D-LREs related to the organization of text (see Examples 4.2, 4.6). This aspect of writing was not assessed in this study and thus further research is needed to assess whether completing collaborative writing has an impact on the organization of subsequent individual text produced by students who complete this type of writing, and how this differs to the changes noted in the same writing of students who complete independent writing.

The impact of LREs on coherence is difficult to ascertain because the same significant increases in coherence were noted in the post-test writing of both groups. It is therefore possible that both writing procedures have led to similar changes in coherence in post-test writing, or that this was due to a factor common to both, such as instruction. However, a review of the examples of collaborative writing dialogue revealed that this interactive writing process presents learners with a number of opportunities to learn about coherence, but further research is needed to assess the impact of the different LREs on this aspect of writing.

9. Conclusion and pedagogical implications

9.1 Conclusion

This study seems to suggest that students learned to correct language use while writing collaboratively and that the subsequent individual writing that they produced became more accurate as a result. This interpretation is supported by the fact that accuracy increased to a significantly greater degree after completing collaborative writing than after completing independent writing under the same conditions and over the same period of time.

Analysis of the collaborative dialogue and the LREs that learners engaged in revealed that while writing collaboratively, students discussed the use of lexis and grammar through L-LREs and F-LREs, and deliberated about correct spelling through M-LREs. They also provided feedback on the correctness of partners' proposals and counter-suggested ways to correctly express these ideas. In addition to this, there were indications that other processes that occur during collaborative writing, such as noticing, may also have led to the increases in accuracy noted. Carrying out collaborative writing seems to offer students a number of different opportunities to learn about correct language use while writing is being completed that are not provided by independent writing. These include opportunities to receive feedback about correct language use, opportunities to learn about language use through LREs and opportunities to notice how language is used while writing is being completed.

There were also significant increases in measures of fluency and in a number of measures of lexical complexity in individual writing after completing collaborative writing as well as significant increases in measures of coherence and cohesion associated with the rhetorical development of writing. However, the same significant increases in these measures were noted in the post-test writing of the independent writing group. Syntactic complexity also did not increase significantly between the pre and post-test writing of either group. As similar changes were noted in both writing groups, it is possible that completing both types of writing have led to the similar development of these measures in the individual writing that students subsequently produce, or that this was due to a factor common to both, such as instruction. The only clear verifiable conclusion that can be drawn is that fluency, complexity (syntactic and lexical) and coherence and cohesion have developed to a similar degree after completing collaborative or independent writing in the 10-week EAP program studied.

9.2 Pedagogical implications

From a pedagogical point of view, the results of this study suggest that carrying out collaborative writing seems to offer a number of advantages to educators and learners in EAP programs and there seem to be no clear drawbacks in using this writing process in relation to the development of individual writing. In this study, there were greater increases in accuracy in individual writing after completing collaborative writing in the 10-week EAP program than after completing independent writing. Other measures of individual writing associated with the linguistic development of writing, such as complexity and fluency, and measures relating to rhetorical development, such as coherence and cohesion, developed in a similar way after completing both writing procedures. Writing collaboratively may allow students to learn about correct language use as they work together and thus is potentially a useful writing to learn activity in this context. From the information above, it is possible to conclude that collaborative writing could be used in EAP programs and alternated with the individual writing that is normally carried out.

9.3 Limitations

The limitations of this study are outlined below.

Participants (see section 6.6, page 63)

The fact that students who took part in this study were from the same country and only included female students could be seen as a moderator variable that could potentially modify the relationship between the independent and dependent variables (Mackey and Gass 2015, p.155). On the other hand, other aspects such as the educational level of the participants, their level of English proficiency and reasons for completing the EAP course may be largely representative of other students who complete similar EAP programs.

Recording during the writing phases (see 6.4, page 62 and section 6.10.2, pages 69-70)

Students who completed collaborative writing were recorded during the writing phase of this study. However, no recording was made of students from the independent group. I expected the writing phase to be mostly silent for the independent writing group which actually was the case, but in retrospect it would have been useful to have made at least one recording of this generally silent process.

Writing activities (see section 6.7, page 65)

During the writing phase students completed two different types of writing. They wrote essays and summaries of texts that they had read. Students only wrote essays for the pre and post-test writing activities and not summaries which they also had completed. It could therefore be argued that the pre and post-test writing activities did not fully reflect the writing that they completed during the study period. However, it was justified not to use summaries as pre and post-test writing activities because it would be difficult to know if the lexis and grammatical structures learners used were ones which they readily used in their own writing, or if this had simply been taken from the original text being summarized.

Recorded collaborative dialogue (see section 6.10.2, pages 69-70)

One of the primary limitations that I faced in this study, was the inability to conduct video recording while students completed collaborative writing. According to the cultural norms of the country in which this study was conducted, video recording or photographing female participants is not allowed and thus audio recording of collaborative dialogue was used. This

allowed me to identify a number of interactive processes, such as peer discussion about language or peer feedback about incorrect language use that may facilitate learning during collaborative writing. However, other interactive processes that sometimes may be **seen** rather than **heard** (such as noticing) were not fully picked up by audio recording.

Preparing (and using) assessment guides and descriptors (see section 6.13.3, page 73)

The assessment guides were designed to be used by an experienced writing assessor and are based upon the assumption that the assessor has knowledge about this area of writing. Using these guides may help to assess consistently only if the person using these has an in-depth knowledge of writing.

Preparation of transcribed texts for computerized analysis (see section 6.14.1, pages 78)

To assess lexical diversity and lexical sophistication using computerized analysis, I had to spell check scripts that had been previously transcribed. Words that were unrecognizable and that could not be spelled checked were not included in this analysis. A second marker did not complete this process, but in retrospect it would have also been better to do so.

Combined manual and computerized assessment (see sections 6.15 and 6.15.2, page 79)

In most of the measures that involved manual and computerized assessment, manual assessment (such as identification of errors) was carried out first and subsequently followed by computerized assessment. As manual assessment was completed first, all examples were assessed by two raters. However, some measures required computerized analysis that subsequently needed to be manually reviewed. This could more correctly be termed as computerized + manual assessment. This included the identification of t-units and the identification of noun phrases. In almost all cases, the computerized identification of t-units was without error, but the application would sometimes identify t-units incorrectly in compound sentences. Accordingly, all of the examples analysed were reviewed. When identifying noun phrases, the tool used would have difficulty distinguishing between words that could act as both a noun and a verb, e.g. fish and thus all examples were also reviewed. The review of computerized assessment was only completed by the first assessor, but this was not checked by the second. It could be argued that this also should have been completed by a second assessor as the subjective interpretation of only one assessor was involved. However, the minimal number of errors did not seem to justify this.

The creation of viable measures of coherence for this study (see section 6.13.4, pages 85-86)

To assess coherence in writing, measures were created for this study which assess two areas of coherence outlined by Celce-Murcia et al (1995), namely **ease of interpretation,** or to whether the sentences in a discourse sequence are **interrelated** (thus easy to follow), or unrelated, or out of synch with one another (p.15). One clear limitation was that these measures had not been used in previous research and thus comparison could not be made between the results of this study and others. It is also recognized that any measures related to coherence are inherently subjective, but there was a high degree of similarity between the assessment of both raters when using these measures.

Calculating the number and ratio of different sentence types indicative of coherence in writing (see section 6.13.4, pages 85-86)

The measure of coherence that I used involved identifying sentences that needed to be reread, that were difficult to understand and that had no logical connection with the sentences around them in each text. From this identification, the remaining number and ratio of sentences that did not cause difficulty for the reader in each text could be gauged. One problem with this identification is that it relies on a singular classification of each sentence type, e.g. a sentence may either be classed as needing to be reread, being difficult to understand, or not being connected to others in the text. It could be argued that it is possible for a sentence to be difficult to understand and not be connected to others in the text at the same time however this identification rests on the primary characteristic of each sentence.

Measures of cohesion used in table 6.9 (see section 6.13.4, page 87)

Measuring cohesion in writing is based on the assumption that the number of cohesive devices will increase as writing develops and clearer connections and transitions are made between the text. I thus predicted that the number of all three cohesive devices identified in this study would increase. However, results seemed to suggest that an increase in the number of noun synonym pairs may result in a corresponding decrease in the number of noun reference pairs; possibly because both cohesive devices perform the same function. This relationship needs to be explored through further investigation, but it is possible that the increases in the use of all cohesive devices may not be an indicator of development of cohesion as was previously

envisioned and that this may involve an increase in certain types of cohesive devices (such as noun synonym pairs) and a possible decrease in the use of others (such as noun reference pairs).

The identification of LREs and their relation to learning (see sections 6.17 and 6.18, pages 88-91) also mentioned in section 8.5.4, page 156 and section 8.8.3, page 164

While I believe that the identification of LREs in this study can be used to answer research question 3, e.g. *To what extent do learners engage in language related episodes associated with learning about language and written discourse while completing collaborative writing?***,** this identification cannot be used to explain all changes in linguistic and rhetorical aspects of individual writing after collaborative writing has been completed. For example, it is difficult to establish a connection between the LREs that students engaged in and changes in fluency. It is also difficult to identify a link between any one type of LRE and coherence because coherence relates to many different aspects of language use and rhetoric.

The classification of LREs (see sections 6.17 and 6.18, page 88-91)

The identification of LREs is based upon a singular classification of each language related episode. However, I recognize that there are instances when the same episode could justifiably be classified in two different ways. In this study, occasionally students would discuss the use of different cohesive devices because they wanted to use devices that were deemed more advanced than others (e.g. *furthermore* or *moreover* instead of *secondly*). Discussion about the use of cohesive devices is associated with cohesion and discourse related D-LREs, but the discussion outlined above could also arguably be classed as a lexical L-LRE.

Assessment of the first and second assessor (LREs) (See section 6.18.3, page 89)

As a sample of the collaborative dialogue was used (25%, n=94), I thought it was better for both the first and second assessors to code all of these examples; given that not all of the examples of collaborative dialogue were analysed and used because of the time and expense required to do so. This differs to the assessment of writing where the first rater assessed all examples of pre and post-test writing (n=256) and the second rater assessed 25% of these (n=64).

The identification of spelling or punctuation related M-LREs and organization or cohesion related D-LREs (see section 6.18.8, page 92)

I wanted to identify the number of D-LREs specifically related to spelling and those solely related to punctuation in addition to the number of M-LREs specifically related to cohesion and those solely related to the organization of text. I decided that it would be too complicated to ask the second assessor to identify the different types of LREs (i.e. L-LREs, F-LREs, M-LREs and D-LREs) and to identify subcomponents of these at the same time. As a result, I decided that after all M-LREs and D-LREs had been identified by both assessors, the first assessor would review all M-LREs and calculate the number of M-LREs specifically related to spelling or punctuation and D-LREs solely related to organization or cohesion. This identification of the subcomponents would then be reviewed by the second assessor. It could be argued that the identification of spelling or punctuation-related M-LREs and organization or cohesion-related D-LREs should have been carried out by both assessors, but this would also have made the process of identification more difficult to complete.

Interpretation of the results of MANOVA and ANOVA analysis (see sections 7.21, 7.22, 7.23, 7.31 and 7.32, pages 102-131) without gauging student opinion about why changes in post-test writing occurred

In this study, I initially understood that evidence of learning would be revealed by differences between the post-test writing of both groups. For example, if there were more pronounced increases in a measure in the post-test writing in one writing group (e.g. accuracy), then this would indicate that the processes that occurred while completing this writing procedure would most likely have led to this change given that both writing procedures (collaborative and independent writing) were completed under the same conditions and over the same period of time. No significant change in either group would also indicate that neither of the writing processes had a significant impact on the individual writing produced over the given period of time.

However, when there are similar significant increases for a given measure in the post-test writing of both groups, interpretation is problematic because this could mean that both writing procedures have led to this change, or that a factor common to both (such as instruction) was responsible. In retrospect, I believe that carrying out semi-structured interviews with students from the collaborative and independent writing groups may have helped to clarify whether similar changes were due to the writing process itself or more likely due to instruction.

Tests of statistical significance associated with coherence and sentences that were not connected to others (see section 7.3.1, pages 124 and 126)

For the analysis of different sentence types that were indicative of coherence, the analysis of variance of sentences that were not connected to others was not carried out. In most of the writing samples analysed, there were no examples of sentences that were not connected to others which was unexpected. Accordingly, analysis of variance was not carried out for this measure because no meaningful variance could be noted.

Interpretation of the multivariate (MANOVA) analysis of cohesion and the number of cohesive devices used in text (see section 7.3.2, pages 130-131)

Unlike the use of other cohesive devices which increased over time in the writing of the collaborative and independent writing groups, the number of noun reference pairs in post-test writing decreased significantly. I envisioned that the number of noun reference pairs would increase, but from the results it may appear that the use of the more simplistic noun reference pairs may decrease as the use of more advanced noun synonym pairs increases because both devices perform the same function. I have therefore interpreted this as a positive shift towards the use of more advanced cohesive devices.

Coherence and collaborative writing (see section 8.5.4, pages 156-159, 161)

The lack of identifiable LREs relating to coherence made it difficult for me to identify student discussions associated with coherence. I could identify different discussions about coherence by reviewing all of the samples of collaborative writing dialogue and then identifying specific exchanges associated with this. This clearly differed to the more structured identification of LREs, but I wanted to look for deliberation about coherence that may explain the significant increases in some measures of coherence in post-test writing and help to interpret the changes noted.

Learners engaged in more D-LREs related to organization than cohesion (see section 7.4.1, page 133 and section 8.5.4, page 160)

One unexpected development associated with the cohesion and organization of the writing produced was that learners engaged in more D-LREs related to organization: specifically relating to the correct arrangement of ideas in writing according to the rhetorical conventions

of the text. I expected students to deliberate about how ideas should be connected in the text (relating to cohesion), but they engaged in very few discourse related episodes associated with this facet of writing. In retrospect, it would have perhaps been better to assess how the organization of individual writing that was subsequently produced was affected by completing either collaborative or independent writing.

9.4 Further investigation

This study highlighted different aspects of L2 writing development that warrant further investigation and as a result I have proposed four different studies to address this. These can be divided into two different areas of investigation.

Proposed studies 1 and **2** (shown below and overleaf) further explore possible differences or similarities between how individual writing develops after completing collaborative or independent writing and gauge student opinions about **why** these changes occur, or **why** no changes are noted. A comparison of how the organization of individual writing develops after completing either collaborative or independent writing is also needed as this was not examined in the present study. As a result, investigation is needed to establish how the organization of individual writing changes after completing both types of writing, **why** possible differences may (or may not) be noted in individual writing after completing both writing procedures and what students could learn about the organization of written discourse from completing collaborative writing, comparing this to what students could potentially learn from completing independent writing.

Other studies are needed to examine the development of different aspects of L2 writing over time, particularly in relation to unexpected changes in certain aspects of individual student writing completed in this study over the 10-week period of investigation. In the present study, the dissimilar development of lexical and syntactic complexity was noted in the writing of both groups. There was also an unexpected decrease in the number of certain cohesive devices in student writing over the period studied which contrasted with an increase in others. The studies that I have proposed (see **Proposed studies 3** and **4**) will focus on the development of these aspects of written discourse in individual writing completed (independently) over time.

Proposed study 1

An investigation of student opinions about the learning potential of collaborative and independent writing in relation to the development of complexity accuracy and fluency in individual writing

Using a similar design to the present study, changes in complexity, accuracy and fluency in individual pre and post-test writing (completed before and after collaborative or independent writing) will be assessed. After this, student opinions about the writing process they completed (either collaborative or independent writing) and its relation to complexity, accuracy and

fluency in individual writing will be gauged through structured questionnaires and semi-structured interviews.

Proposed study 2

An investigation of student opinions about the learning potential of collaborative and independent writing in relation to the development of coherence, cohesion and organization of individual writing

Using the same procedure as the study listed above, this study will assess the effects of carrying out collaborative or independent writing on the coherence, cohesion and organization of individual writing that students subsequently produce, and then gauge the learners' opinions about the writing process that they completed (either collaborative or independent writing) and its relation to changes in the coherence, cohesion, and organization of their individual writing.

Proposed study 3

A longitudinal study of changes in lexical and syntactic complexity in second language writing

This study will analyze changes in lexical and syntactic complexity in student writing completed over an extended period of time (two semesters) assessing changes in individual writing completed at the beginning, middle and end of each semester (e.g. 6 writing samples). At the end of the study period, semi-structured interviews with randomly selected students will be carried out to review possible changes in student writing samples over time and to discuss any changes in syntactic and lexical complexity that may have occurred, or why changes did not occur.

Proposed study 4

A longitudinal study of changes in the use of cohesive devices in second language writing

Using the same procedure mentioned above, this study will analyze the changes in the use of different cohesive devices (such as cohesive conjunctions, noun reference pairs and noun synonym pairs) in individual writing completed over an extended period of time and then gauge student opinions about these possible changes. This research could also be carried out in conjunction with the study previously outlined.

10. References

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11. Appendices

Analysis of pre and post-test writing

A. Instruments

Appendix A1	Writing task A
Appendix A2	Writing task A
Appendix A3	Transcribed text for computerized analysis
Appendix A4	Transcribed text with corrected spelling for computerized analysis

B. Manual assessment of writing

Appendix B1	Randomly ordering collaborative and independent group pre and post-test writing scripts and assigning a number to each of the scripts (n=256)
Appendix B2	Randomly ordered scripts with identifying information removed marked assessed by the first rater (n=256)
Appendix B3	Randomly selected scripts to be second marked (n=64)
Appendix B4	Randomly selected scripts reassessed by the first assessor to check intra-rater reliability (n=26)
Appendix B5	Example of a raw data entry (1st marker – error data n=256)
Appendix B6	Example of a raw data entry (2nd marker – error data n=64)
Appendix B7	Example of a raw data reassessment of 10% of the original scripts by the first marker (error data n=26)
Appendix B8	Comparison of first and second marker rating and final resolution of score differences (n=64)
Appendix B9	A comparison of the first assessor's first and second rating of 10% of randomly selected scripts to check intra-rater reliability (n=26)
Appendix B10	Final raw data submitted for analysis (error data n=256)
Appendix B.11	Raw data scores reassembled (by group and writing task) for analysis (error data n=256)

C. Measures of writing

Appendix C1	Identification of words per text
Appendix C2	Analysis of average sentence length
Appendix C3	Identification of the number of simple, compound, and complex sentences per text
Appendix C4	Identification t-units
Appendix C5	Identification of words per t-unit
Appendix C6	Calculation of mean length of noun phrase
Appendix C7	Assessment of lexical diversity
Appendix C8	Assessment of lexical sophistication
Appendix C9	Identification of the number of errors (by type) per text
Appendix C10	Identification of the number of error-free t-units per text
Appendix C11	Identification of words per error-free t-unit
Appendix C12	Number of correct/incorrect cohesive conjunctions per text
Appendix C13	Number of correct/incorrect noun-reference pairs per text
Appendix C14	Number of correct/incorrect noun/synonym pairs per text

Appendix C15 Identification of sentences that needed to be reread, were difficult to understand, that were not connected, or that did not cause difficulty for the reader per text
Appendix C16 Measures of dispersion for measures of writing

D. Assessment guides

Appendix D.1 Simple, compound, and complex sentence identification guide
Appendix D.2 Correct/incorrect cohesive conjunction guide
Appendix D.3 Correct/incorrect noun reference pair identification guide
Appendix D.4 Correct/incorrect noun synonym pair identification guide
Appendix D.5 Guide to identifying sentences that need to be reread, are difficult to understand and that are not connected to others in the text
Appendix D.6 Guide to identifying errors in writing scripts

Identification of language related episodes (LREs) in collaborative writing dialogue

E. Instruments

Appendix E.1 Sample of collaborative writing dialogue

F. Manual identification of LREs

Appendix F.1 Samples of collaborative dialogue assessed by assessor 1 and assessor 2 (n=94)
Appendix F.2 Identification of LREs in collaborative dialogue reassessed by assessor 1 to check intra-rater reliability (n=10)
Appendix F.3 Identification of LREs in samples of collaborative dialogue (n=94) assessed by assessor 1
Appendix F.4 Identification of LREs in samples of collaborative dialogue (n=94) assessed by assessor 2
Appendix F.5 Score differences between rater 1 and rater 2 and final score resolution (n=94)
Appendix F.6 Score differences the first assessment and reassessment of 10% of samples randomly selected (n=10)
Appendix F.7 Final assessment of LREs in collaborative writing dialogue agreed upon by both assessors (n=94)

G. Measures of language related episodes (LREs)

Appendix G.1 – Example of a transcribed collaborative dialogue with highlighted LREs

H. Assessment guide

Appendix H.1 Guide to identification of LREs in collaborative writing dialogue

I. Miscellaneous

Appendix I.1 Student data included or not included in this study

Appendix A.1– Writing task A

Some people say that childhood obesity is increasing in many countries around the world. What are the possible causes of this increase and what can be done to deal with this problem?

- Childhood obesity is a seemingly increasing problem in many countries. countries. Obesity in childhood It can lead to a series of risk foot factors in future life, and effect your daily life style.

- One of the many consequences of obesity, particularly in childhood is the withdrawal from everyday activities due to the hardship of performing physical tasks. This affects you by this furtherly affects your mental condition as you become realise it takes a lot of effort to do physical tasks, including exercising, and so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

- Another consequense of child hood obesity is your image in front of others. It's very common that obese children tends to get bullied or made fun of; and it can drive the victims to doing making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from over-eating or eating not right. there are certain manners to follow towards improving your weight size; one of them is to see a dietician.

- Obesity is a major problem for all ages, however children could victimise themselves easier for this physical condition. It should be taken care of while you are still young because in the future, there will be more responsibities upon themselves.

Appendix A.2 Writing task B

Some people say the young people do not do as much exercise as they did in the past. What are the possible causes of this problem and what can be done to deal with this issue?

- SO why does in these days or this certain generation does not focus on exercise and don't do it?
- Heres some TOP reasons why occurs these things such as, young people now focus on social media, donot feel intrested, the technolgy way System, As boys keep playing video games, and there not in the mood to walk because of the hot weather.

young people know days are so obssesed with technology and they waste most of their time on it, they feel that it's a very important thing which they cant stop from doing it. This might really effect to them by health conditions which make them not healthy and feel all the time weak. Intrest is also getting in loss of doing activities, in my oppinion there should be more different ways to make young people get in intrest to do new things and which contains exersice. Such as for example making a challange which makes each person gets exited to join into it. And Maybe may cannot offer themselves amount of money they need to go to a certain club which many activities, I would also reccomend to make not a free clubs but which people can afford to go there, because some are really highly priced. And as for Own health even if would not do it evrey day you might do it each couple of days. And At last I would reccomend each person to change into your self even though a little bit and get more healthier through each time of a moment and that would change your personalty and make you make positive into life.

Appendix A.3 Transcribed text for computerized analysis

Sample

Childhood obesity is a seemingly increasing problem in many countries. It can lead to a series of risk factors in future life and effect your daily life style.

On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of others. It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician.

Obesity is a major problem for all ages. However children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Appendix A.4 Transcribed text with corrected spelling for computerized analysis

Sample

Childhood obesity is a seemingly increasing problem in many countries. It can lead to a series of risk factors in future life and effect your daily life style.

On of the many consequences of obesity, particularly in childhood, is the withdrawal from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of others. It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician.

Obesity is a major problem for all ages. However children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibilities put upon themselves.

Key

Spell checked and corrected word

Appendix B.1 Randomly ordering collaborative and independent group pre and post-test writing scripts and assigning an identifying number to each of the scripts (n=256)

Key

C1, C2, C3, C4 = the first, second, third and fourth groups that completed collaborative writing
I1, I2, I3, I4 = the first, second, third and fourth groups that completed independent writing
Numbers 1 to 24 = the number of each student on the class register, e.g. the first student on the register is #1
PR= pre-test writing, PZO=post-test writing

Example

C1-1-PR = Collaborative writing group 1, student 1, pre-test writing assigned random order # 66
C1-1-PZO = Collaborative writing group 1, student 1, post-test-test writing assigned random order # 224

A – Scripts ordered by group and writing task assigned a random number between 1 and 256

Pre-test scripts Collaborative		Post-test scripts Collaborative		Pre-test scripts Collaborative		Post-test scripts Collaborative		Pre-test scripts Independent		Post-test scripts Independent		Pre-test scripts Independent		Post-test scripts Independent	
66	C1-1 PR	224	C1-1 PZO	181	C3-1 PR	106	C3-1 PZO	196	I1-1 PR	209	I1-1 PZO	231	I2-14-PR	146	I2-14 PZO
157	C1-4 PR	100	C1-4 PZO	61	C3-2 PR	239	C3-2 PZO	123	I1-2 PR	148	I1-2 PZO	107	I3-2 PR	1	I3-2 PZO
54	C1-5 PR	248	C1-5 PZO	17	C3-3 PR	86	C3-3 PZO	45	I1-3 PR	221	I1-3 PZO	115	I3-3 PR	155	I3-3 PZO
67	C1-6 PR	10	C1-6 PZO	159	C3-5 PR	89	C3-5 PZO	94	I1-4 PR	77	I1-4 PZO	13	I3-4 PR	93	I3-4 PZO
6	C1-7 PR	23	C1-7 PZO	103	C3-6 PR	71	C3-6 PZO	110	I1-6 PR	229	I1-6 PZO	177	I3-5 PR	37	I3-5 PZO
152	C1-11 PR	191	C1-11 PZO	252	C3-8 PR	41	C3-8 PZO	64	I1-7 PR	223	I1-7 PZO	188	I3-7 PR	125	I3-7 PZO
250	C1-12 PR	21	C1-12 PZO	15	C3-9 PR	153	C3-9 PZO	166	I1-8 PR	78	I1-8 PZO	170	I3-8 PR	174	I3-8 PZO
186	C1-13 PR	68	C1-13 PZO	171	C3-10 PR	207	C3-10 PZO	175	I1-9 PR	162	I1-9 PZO	58	I3-9 PR	108	I3-9 PZO
164	C1-14 PR	128	C1-14 PZO	14	C3-11 PR	145	C3-11 PZO	56	I1-10 PR	167	I1-10 PZO	254	I3-12 PR	19	I3-12 PZO
213	C1-15 PR	237	C1-15 PZO	140	C3-12 PR	47	C3-12 PZO	243	I1-11 PR	228	I1-11 PZO	245	I3-13 PR	222	I3-13 PZO
211	C1-16 PR	32	C1-16 PZO	218	C3-14 PR	241	C3-14 PZO	76	I1-12 PR	52	I1-12 PZO	227	I3-15 PR	132	I3-15 PZO
42	C1-17 PR	200	C1-17 PZO	208	C3-16 PR	182	C3-16 PZO	240	I1-13 PR	219	I1-13 PZO	30	I3-18 PR	49	I3-18 PZO
59	C1-18 PR	7	C1-18 PZO	111	C3-18 PR	109	C3-18 PZO	136	I1-15 PR	206	I1-15 PZO	91	I3-19 PR	160	I3-19 PZO
204	C1-19 PR	172	C1-19 PZO	149	C3-20 PR	236	C3-20 PZO	134	I1-16 PR	144	I1-16 PZO	92	I3-20 PR	151	I3-20 PZO
12	C1-20 PR	2	C1-20 PZO	238	C3-22 PR	119	C3-22 PZO	62	I1-18 PR	75	I1-18 PZO	217	I1-21 PR	154	I1-21 PZO
63	C1-22 PR	85	C1-22 PZO	192	C3-24 PR	46	C3-24 PZO	4	I1-20 PR	187	I1-20 PZO	24	I1-22 PR	249	I1-22 PZO
104	C2-1 PR	197	C2-1 PZO	16	C4-2 PR	22	C4-2 PZO	31	I2-1 PR	48	I2-1 PZO	183	I4-2 PR	253	I4-2 PZO
199	C2-2 PR	117	C2-2 PZO	101	C4-5 PR	127	C4-5 PZO	233	I2-2 PR	168	I2-2 PZO	180	I4-3 PR	138	I4-3 PZO
65	C2-3 PR	198	C2-3 PZO	84	C4-6 PR	176	C4-6 PZO	242	I2-3 PR	5	I2-3 PZO	60	I4-5 PR	33	I4-5 PZO
57	C2-5 PR	35	C2-5 PZO	51	C4-8 PR	114	C4-8 PZO	98	I2-4 PR	3	I2-4 PZO	80	I4-6 PR	194	I4-6 PZO
169	C2-7 PR	202	C2-7 PZO	53	C4-9 PR	122	C4-9 PZO	179	I2-7 PR	195	I2-7 PZO	81	I4-7 PR	205	I4-7 PZO
230	C2-8 PR	25	C2-8 PZO	8	C4-10 PR	121	C4-10 PZO	99	I2-8 PR	203	I2-8 PZO	129	I4-8 PR	105	I4-8 PZO
193	C2-10 PR	215	C2-10 PZO	137	C4-11 PR	232	C4-11 PZO	87	I2-9 PR	50	I2-9 PZO	131	I4-9 PR	173	I4-9 PZO
28	C2-11 PR	72	C2-11 PZO	120	C4-13 PR	43	C4-13 PZO	184	I2-10 PR	235	I2-10 PZO	256	I4-10 PR	126	I4-10 PZO
70	C2-12 PR	189	C2-12 PZO	96	C4-15 PR	29	C4-15 PZO	69	I2-11 PR	83	I2-11 PZO	246	I4-11 PR	201	I4-11 PZO
95	C2-14 PR	55	C2-14 PZO	244	C4-17 PR	39	C4-17 PZO	216	I2-12 PR	11	I2-12 PZO	102	I4-12 PR	214	I4-12 PZO
90	C2-15 PR	226	C2-15 PZO	234	C4-18 PR	130	C4-18 PZO	190	I2-13 PR	124	I2-13 PZO	40	I4-13 PR	79	I4-13 PZO
9	C2-16 PR	82	C2-16 PZO	139	C4-19 PR	44	C4-19 PZO	97	I2-17 PR	255	I2-17 PZO	141	I4-15 PR	34	I4-15 PZO
27	C2-19 PR	156	C2-19 PZO	165	C4-20 PR	147	C4-20 PZO	210	I2-18 PR	135	I2-18 PZO	88	I4-16 PR	178	I4-16 PZO
142	C2-21 PR	74	C2-21 PZO	20	C4-22 PR	247	C4-22 PZO	38	I2-19 PR	118	I2-19 PZO	163	I4-17 PR	112	I4-17 PZO
251	C2-23 PR	185	C2-23 PZO	161	C4-23 PR	113	C4-23 PZO	150	I2-20 PR	73	I2-20 PZO	225	I4-18 PR	116	I4-18 PZO
158	C2-24 PR	220	C2-24 PZO	143	C4-24 PR	26	C4-24 PZO	18	I2-21 PR	133	I2-21 PZO	212	I4-19 PR	36	I4-19 PZO

B – Scripts jumbled by ordering the randomly assigned number (between 1 and 256)

1	I3-2 PZO	33	I4-5 PZO	65	C2-3 PR	97	I2-17 PR	129	I4-8 PR	161	C4-23 PR	193	C2-10 PR	225	I4-18 PR
2	C1-20 PZO	34	I4-15 PZO	66	C1-1 PR	98	I2-4 PR	130	C4-18 PZO	162	I1-9 PZO	194	I4-6 PZO	226	C2-15 PZO
3	I2-4 PZO	35	C2-5 PZO	67	C1-6 PR	99	I2-8 PR	131	I4-9 PR	163	I4-17 PR	195	I2-7 PZO	227	13-15 PR
4	I1-20 PR	36	I4-19 PZO	68	C1-13 PZO	100	C1-4 PZO	132	13-15 PZO	164	C1-14 PR	196	I1-1 PR	228	I1-11 PZO
5	I2-3 PZO	37	I3-5 PZO	69	I2-11 PR	101	C4-5 PR	133	I2-21 PZO	165	C4-20 PR	197	C2-1 PZO	229	I1-6 PZO
6	C1-7 PR	38	I2-19 PR	70	C2-12 PR	102	I4-12 PR	134	I1-16 PR	166	I1-8 PR	198	C2-3 PZO	230	C2-8 PR
7	C1-18 PZO	39	C4-17 PZO	71	C3-6 PZO	103	C3-6 PR	135	I2-18 PZO	167	I1-10 PZO	199	C2-2 PR	231	12-14-PR
8	C4-10 PR	40	I4-13 PR	72	C2-11 PZO	104	C2-1 PR	136	I1-15 PR	168	I2-2 PZO	200	C1-17 PZO	232	C4-11 PZO
9	C2-16 PR	41	C3-8 PZO	73	I2-20 PZO	105	I4-8 PZO	137	C4-11 PR	169	C2-7 PR	201	I4-11 PZO	233	I2-2 PR
10	C1-6 PZO	42	C1-17 PR	74	C2-21 PZO	106	C3-1 PZO	138	I4-3 PZO	170	I3-8 PR	202	C2-7 PZO	234	C4-18 PR
11	I2-12 PZO	43	C4-13 PZO	75	I1-18 PZO	107	I3-2 PR	139	C4-19 PR	171	C3-10 PR	203	I2-8 PZO	235	I2-10 PZO
12	C1-20 PR	44	C4-19 PZO	76	I1-12 PR	108	I3-9 PZO	140	C3-12 PR	172	C1-19 PZO	204	C1-19 PR	236	C3-20 PZO
13	I3-4 PR	45	I1-3 PR	77	I1-4 PZO	109	C3-18 PZO	141	I4-15 PR	173	I4-9 PZO	205	I4-7 PZO	237	C1-15 PZO
14	C3-11 PR	46	C3-24 PZO	78	I1-8 PZO	110	I1-6 PR	142	C2-21 PR	174	I3-8 PZO	206	I1-15 PZO	238	C3-22 PR
15	C3-9 PR	47	C3-12 PZO	79	I4-13 PZO	111	C3-18 PR	143	C4-24 PR	175	I1-9 PR	207	C3-10 PZO	239	C3-2 PZO
16	C4-2 PR	48	I2-1 PZO	80	I4-6 PR	112	I4-17 PZO	144	I1-16 PZO	176	C4-6 PZO	208	C3-16 PR	240	I1-13 PR
17	C3-3 PR	49	I3-18 PZO	81	I4-7 PR	113	C4-23 PZO	145	C3-11 PZO	177	I3-5 PR	209	I1-1 PZO	241	C3-14 PZO
18	I2-21 PR	50	I2-9 PZO	82	C2-16 PZO	114	C4-8 PZO	146	I2-14 PZO	178	I4-16 PZO	210	I2-18 PR	242	I2-3 PR
19	I3-12 PZO	51	C4-8 PR	83	I2-11 PZO	115	I3-3 PR	147	C4-20 PZO	179	I2-7 PR	211	C1-16 PR	243	I1-11 PR
20	C4-22 PR	52	I1-12 PZO	84	C4-6 PR	116	I4-18 PZO	148	I1-2 PZO	180	I4-3 PR	212	I4-19 PR	244	C4-17 PR
21	C1-12 PZO	53	C4-9 PR	85	C1-22 PZO	117	C2-2 PZO	149	C3-20 PR	181	C3-1 PR	213	C1-15 PR	245	I3-13 PR
22	C4-2 PZO	54	C1-5 PR	86	C3-3 PZO	118	I2-19 PZO	150	I2-20 PR	182	C3-16 PZO	214	I4-12 PZO	246	I4-11 PR
23	C1-7 PZO	55	C2-14 PZO	87	I2-9 PR	119	C3-22 PZO	151	I3-20 PZO	183	I4-2 PR	215	C2-10 PZO	247	C4-22 PZO
24	I1-22 PR	56	I1-10 PR	88	I4-16 PR	120	C4-13 PR	152	C1-11 PR	184	I2-10 PR	216	I2-12 PR	248	C1-5 PZO
25	C2-8 PZO	57	C2-5 PR	89	C3-5 PZO	121	C4-10 PZO	153	C3-9 PZO	185	C2-23 PZO	217	I1-21 PR	249	I1-22 PZO
26	C4-24 PZO	58	I3-9 PR	90	C2-15 PR	122	C4-9 PZO	154	I1-21 PZO	186	C1-13 PR	218	C3-14 PR	250	C1-12 PR
27	C2-19 PR	59	C1-18 PR	91	I3-19 PR	123	I1-2 PR	155	I3-3 PZO	187	I1-20 PZO	219	I1-13 PZO	251	C2-23 PR
28	C2-11 PR	60	I4-5 PR	92	I3-20 PR	124	I2-13 PZO	156	C2-19 PZO	188	I3-7 PR	220	C2-24 PZO	252	C3-8 PR
29	C4-15 PZO	61	C3-2 PR	93	I3-4 PZO	125	I3-7 PZO	157	C1-4 PR	189	C2-12 PZO	221	I1-3 PZO	253	I4-2 PZO
30	I3-18 PR	62	I1-18 PR	94	I1-4 PR	126	I4-10 PZO	158	C2-24 PR	190	I2-13 PR	222	I3-13 PZO	254	I3-12 PR
31	I2-1 PR	63	C1-22 PR	95	C2-14 PR	127	C4-5 PZO	159	C3-5 PR	191	C1-11 PZO	223	I1-7 PZO	255	I2-17 PZO
32	C1-16 PZO	64	I1-7 PR	96	C4-15 PR	128	C1-14 PZO	160	I3-19 PZO	192	C3-24 PR	224	C1-1 PZO	256	I4-10 PR

Appendix B.2 Randomly ordered scripts (with identifying information removed) assessed by the first rater (n=256)

Explanation and example

The identifying codes were removed from all randomly ordered scripts leaving the script number.

For example, the identifying code I3-2-PZO was removed from the first script (see B.1. B, script number 1).

1	33	65	97	129	161	193	225
2	34	66	98	130	162	194	226
3	35	67	99	131	163	195	227
4	36	68	100	132	164	196	228
5	37	69	101	133	165	197	229
6	38	70	102	134	166	198	230
7	39	71	103	135	167	199	231
8	40	72	104	136	168	200	232
9	41	73	105	137	169	201	233
10	42	74	106	138	170	202	234
11	43	75	107	139	171	203	235
12	44	76	108	140	172	204	236
13	45	77	109	141	173	205	237
14	46	78	110	142	174	206	238
15	47	79	111	143	175	207	239
16	48	80	112	144	176	208	240
17	49	81	113	145	177	209	241
18	50	82	114	146	178	210	242
19	51	83	115	147	179	211	243
20	52	84	116	148	180	212	244
21	53	85	117	149	181	213	245
22	54	86	118	150	182	214	246
23	55	87	119	151	183	215	247
24	56	88	120	152	184	216	248
25	57	89	121	153	185	217	249
26	58	90	122	154	186	218	250
27	59	91	123	155	187	219	251
28	60	92	124	156	188	220	252
29	61	93	125	157	189	221	253
30	62	94	126	158	190	222	254
31	63	95	127	159	191	223	255
32	64	96	128	160	192	224	256

Appendix B.3 Randomly selected scripts to be second marked (n=64)

1	33	65	97	129	161	193	225
2	34	66	98	130	162	194	226
3	35	67	99	131	163	195	227
4	36	68	100	132	164	196	228
5	37	69	101	133	165	197	229
6	38	70	102	134	166	198	230
7	39	71	103	135	167	199	231
8	40	72	104	136	168	200	232
9	41	73	105	137	169	201	233
10	42	74	106	138	170	202	234
11	43	75	107	139	171	203	235
12	44	76	108	140	172	204	236
13	45	77	109	141	173	205	237
14	46	78	110	142	174	206	238
15	47	79	111	143	175	207	239
16	48	80	112	144	176	208	240
17	49	81	113	145	177	209	241
18	50	82	114	146	178	210	242
19	51	83	115	147	179	211	243
20	52	84	116	148	180	212	244
21	53	85	117	149	181	213	245
22	54	86	118	150	182	214	246
23	55	87	119	151	183	215	247
24	56	88	120	152	184	216	248
25	57	89	121	153	185	217	249
26	58	90	122	154	186	218	250
27	59	91	123	155	187	219	251
28	60	92	124	156	188	220	252
29	61	93	125	157	189	221	253
30	62	94	126	158	190	222	254
31	63	95	127	159	191	223	255
32	64	96	128	160	192	224	256

Key

Scripts graded by the second assessor

Appendix B.4 Randomly selected scripts reassessed by the first assessor to check intra-rater reliability (n=26)

1	33	65	97	129	161	193	225
2	34	66	98	130	162	194	226
3	35	67	99	131	163	195	227
4	36	68	100	132	164	196	228
5	37	69	101	133	165	197	229
6	38	70	102	134	166	198	230
7	39	71	103	135	167	199	231
8	40	72	104	136	168	200	232
9	41	73	105	137	169	201	233
10	42	74	106	138	170	202	234
11	43	75	107	139	171	203	235
12	44	76	108	140	172	204	236
13	45	77	109	141	173	205	237
14	46	78	110	142	174	206	238
15	47	79	111	143	175	207	239
16	48	80	112	144	176	208	240
17	49	81	113	145	177	209	241
18	50	82	114	146	178	210	242
19	51	83	115	147	179	211	243
20	52	84	116	148	180	212	244
21	53	85	117	149	181	213	245
22	54	86	118	150	182	214	246
23	55	87	119	151	183	215	247
24	56	88	120	152	184	216	248
25	57	89	121	153	185	217	249
26	58	90	122	154	186	218	250
27	59	91	123	155	187	219	251
28	60	92	124	156	188	220	252
29	61	93	125	157	189	221	253
30	62	94	126	158	190	222	254
31	63	95	127	159	191	223	255
32	64	96	128	160	192	224	256

Key

Scripts reassessed by the first assessor

Appendix B.5 Example of a raw data entry (1st marker – error data)

Key

ROS # = randomly ordered script number
#GE/t = number of grammatical errors per text
#LE/t = number of lexical errors per text
#SE/t = number of spelling errors per text

ROS #	# GE/t	# LE/t	# SE/t
1	30	18	22
2	8	8	1
3	3	4	1
4	17	6	15
5	13	13	10
6	2	6	1
7	1	8	0
8	7	9	7
9	18	9	18
10	4	3	2
11	14	10	2
12	16	8	5
13	3	4	6
14	20	16	9
15	10	6	16
16	1	7	7
17	14	14	7
18	6	6	4
19	19	8	10
20	15	13	12
21	3	5	0
22	5	6	4
23	1	2	6
24	11	7	12
25	18	15	13
26	18	8	4
27	3	4	3
28	6	4	10
29	19	9	12
30	15	6	1
31	1	0	4
32	1	1	3

ROS #	# GE/t	# LE/t	# SE/t
33	14	18	6
34	7	2	1
35	11	9	4
36	11	5	12
37	16	7	1
38	5	1	0
39	11	18	2
40	4	6	0
41	17	10	12
42	16	12	7
43	29	19	13
44	11	6	7
45	0	5	7
46	20	14	11
47	11	10	5
48	6	1	10
49	20	6	2
50	4	7	3
51	17	10	7
52	9	9	13
53	4	8	8
54	4	6	2
55	22	3	6
56	13	8	14
57	8	9	9
58	27	9	9
59	6	13	9
60	22	13	1
61	20	12	12
62	8	13	5
63	7	15	24
64	15	6	10

ROS #	# GE/t	# LE/t	# SE/t
65	14	3	0
66	2	5	5
67	2	6	0
68	4	4	2
69	8	4	11
70	7	10	6
71	29	11	14
72	9	5	2
73	6	8	5
74	8	3	5
75	14	17	5
76	11	17	9
77	9	10	7
78	17	7	0
79	10	12	8
80	6	13	19
81	25	17	12
82	10	7	5
83	8	6	5
84	9	7	4
85	6	4	18
86	17	11	5
87	3	1	1
88	9	2	2
89	29	23	10
90	9	15	6
91	13	8	12
92	14	9	4
93	3	7	5
94	10	9	9
95	21	7	5
96	16	9	11

ROS #	# GE/t	# LE/t	# SE/t
97	2	7	13
98	6	7	4
99	1	5	2
100	5	5	2
101	12	5	20
102	17	12	7
103	26	13	8
104	2	10	0
105	13	18	14
106	41	11	6
107	15	14	10
108	19	5	6
109	22	8	12
110	7	1	3
111	16	9	11
112	4	1	5
113	10	11	12
114	14	19	5
115	7	12	9
116	13	7	2
117	5	7	1
118	3	3	0
119	16	12	12
120	20	9	19
121	9	0	1
122	9	4	4
123	13	19	9
124	13	5	11
125	36	24	3
126	21	15	10
127	14	14	18
128	0	2	1

ROS #	# GE/t	# LE/t	# SE/t
129	18	24	8
130	18	8	5
131	6	5	4
132	15	7	7
133	4	7	3
134	12	8	5
135	6	6	7
136	9	14	5
137	16	4	2
138	5	7	2
139	10	3	13
140	12	8	4
141	4	7	2
142	12	8	8
143	19	14	2
144	3	7	6
145	14	17	5
146	2	5	3
147	13	14	6
148	15	15	2
149	23	10	6
150	4	2	1
151	16	8	10
152	4	9	6
153	7	7	13
154	12	4	3
155	8	8	10
156	4	4	9
157	4	5	0
158	9	13	20
159	16	17	17
160	24	11	13

ROS #	# GE/t	# LE/t	# SE/t
161	13	5	18
162	24	17	3
163	3	1	2
164	0	1	0
165	11	18	8
166	15	13	1
167	11	10	13
168	2	1	4
169	19	14	12
170	5	6	17
171	17	11	11
172	2	6	1
173	1	3	0
174	8	8	6
175	15	11	9
176	13	7	4
177	8	11	8
178	8	4	6
179	2	6	5
180	1	4	0
181	20	12	3
182	13	7	16
183	2	6	12
184	17	9	22
185	8	4	4
186	6	7	3
187	23	14	3
188	14	20	6
189	21	11	12
190	5	7	8
191	9	3	2
192	29	19	9

ROS #	# GE/t	# LE/t	# SE/t
193	2	3	0
194	6	4	10
195	7	4	3
196	11	9	15
197	3	2	1
198	7	5	0
199	10	5	2
200	12	5	5
201	8	12	7
202	14	12	7
203	9	6	4
204	2	6	2
205	24	25	24
206	15	8	2
207	23	24	12
208	9	6	11
209	17	13	22
210	4	3	2
211	1	2	1
212	17	4	10
213	5	14	7
214	10	19	6
215	1	1	0
216	7	17	3
217	20	9	11
218	17	15	20
219	16	3	3
220	7	11	15
221	1	10	0
222	30	24	8
223	19	6	18
224	0	2	4

ROS #	# GE/t	# LE/t	# SE/t
225	13	12	5
226	10	11	8
227	7	11	10
228	8	7	5
229	9	1	1
230	26	6	11
231	4	5	5
232	8	3	5
233	5	5	2
234	9	4	2
235	8	5	28
236	34	13	14
237	4	4	4
238	20	12	12
239	17	11	8
240	7	6	5
241	22	14	22
242	18	11	15
243	12	7	3
244	11	17	8
245	21	7	2
246	9	14	12
247	7	17	29
248	2	6	1
249	15	8	3
250	7	6	12
251	9	10	11
252	22	10	6
253	1	8	7
254	16	9	4
255	2	5	20
256	7	5	5

Appendix B.6 Example of a raw data entry (2nd marker – error data n=64)

	2nd marker scripts n=64		
ROS #	# GE/t	# LE/t	# SE/t
2	8	8	1
3	3	8	3
5	13	13	10
10	4	3	2
13	3	4	6
21	3	5	0
22	5	6	4
27	3	4	3
30	15	6	1
33	14	18	6
36	11	5	12
54	4	6	2
56	13	8	14
67	2	6	0
71	26	11	14
73	6	8	5
78	17	7	0
83	8	6	5
85	7	8	14
88	9	2	2
89	29	23	10
93	3	7	5
96	16	9	11
97	2	7	13
99	1	5	1
105	13	18	14
108	19	5	6
109	22	8	12
116	13	7	2
117	5	7	1
131	6	5	4
132	15	7	7

	2nd marker scripts n=64		
ROS #	# GE/t	# LE/t	#SE/t
139	10	3	13
143	19	14	2
145	14	17	5
151	16	8	10
158	9	13	14
159	22	26	9
164	0	1	0
171	10	15	12
172	2	6	1
178	8	4	6
183	2	6	12
187	20	8	9
194	6	4	10
197	3	2	1
203	9	6	4
210	4	3	2
211	1	2	1
214	10	19	6
215	1	1	0
217	20	9	11
223	19	6	18
229	10	3	0
235	8	5	28
242	18	11	15
243	8	7	2
244	11	17	8
247	7	17	24
249	15	8	3
250	7	6	12
251	9	10	11
256	7	5	5

Appendix B.7 Example of a raw data reassessment of 10% of the original scripts by the first marker (error data n=26)

Rater 1 - Second rating			
ROS #	# GE/t	# LE/t	# SE/t
4	17	6	15
6	2	6	1
7	1	8	0
8	7	9	7
13	3	4	6
18	6	6	4
29	19	9	12
47	11	10	5
52	9	9	13
53	4	8	8
64	15	6	10
66	2	5	5
70	7	10	6
81	25	17	12
89	29	23	9
110	7	1	3
139	10	3	13
141	4	7	2
151	16	8	10
170	5	6	17
178	8	4	6
216	7	17	3
234	9	4	2
236	34	13	14
241	22	14	22
256	7	5	5

Appendix B.8 Comparison of first and second marker rating and final resolution of score differences

	2nd marker scripts n=64					1ST marker script scores			
ROS #	# GE/t	# LE/t	# SE/t		ROS #	# GE/t	# LE/t	#SE/t
2	8	8	1	=	2	8	8	1
3	3	8	3	≠	3	3	4	1
5	13	13	10	=	5	13	13	10
10	2	4	2	=	10	2	4	2
13	3	4	3	=	13	3	4	3
21	3	5	0	=	21	3	5	0
22	5	6	2	=	22	5	6	2
27	3	4	3	=	27	3	4	3
30	15	6	1	=	30	15	6	1
33	14	18	2	=	33	14	18	2
36	11	5	12	=	36	11	5	12
54	6	6	1	=	54	6	6	1
56	13	8	14	=	56	13	8	14
67	2	8	1	=	67	2	8	1
71	26	11	14	≠	71	29	11	14
73	6	8	5	=	73	6	8	5
78	17	7	0	=	78	17	7	0
83	8	6	4	=	83	8	6	4
85	6	7	15	≠	85	6	4	18
88	9	2	2	=	88	9	2	2
89	29	26	10	=	89	29	26	10
93	3	7	5	=	93	3	7	5
96	16	9	11	=	96	16	9	11
97	2	7	13	=	97	2	7	13
99	1	5	1	≠	99	1	5	2
105	13	18	12	=	105	13	18	12
108	19	5	6	=	108	19	5	6
109	22	8	12	=	109	22	8	12
116	13	7	2	=	116	13	7	2
117	5	7	1	=	117	5	7	1
131	6	5	2	=	131	6	5	2
132	15	7	7	=	132	15	7	7
137	16	4	2	=	137	16	4	2
139	10	3	13	=	139	10	3	11
143	19	14	2	=	143	19	14	2
145	14	17	5	=	145	14	17	5

	Resolved final score		
ROS #	# GE/t	# LE/t	# SE/t
3	3	8	3
71	36	14	17
85	7	8	14
99	1	5	2
158	9	15	19
159	19	18	14
171	18	13	13
187	20	8	10
229	10	3	1
243	12	7	3
247	9	15	29

Key

ROS # = randomly ordered script number

#GE/t – number of grammatical errors per text

#LE/t – number of lexical errors per text

#SE/t – number of spelling errors per text

Inter-rater reliability – simple percentage agreement

Marker 2 = 64 randomly selected scripts

Score difference

Number of scripts with score differences between marker 1 and 2 = 11/64

Agreement= 53/64* 100
= 82.81%

151	16	8	8	=	151	16	8	8
158	9	13	14	≠	158	9	13	20
159	22	26	9	≠	159	16	17	17
164	0	1	0		164	0	1	0
171	10	15	12	≠	171	17	11	11
172	2	6	1	=	172	2	6	1
178	8	4	6	=	178	8	4	6
183	2	6	12	=	183	2	6	12
187	20	8	9	≠	187	23	14	3
194	6	4	8	=	194	6	4	8
197	3	2	1	=	197	3	2	1
203	5	6	4	=	203	5	6	4
210	4	3	2	=	210	4	3	2
211	1	2	0	=	211	1	2	0
214	10	19	5	=	214	10	19	5
215	1	1	0	=	215	1	1	0
217	20	9	11	=	217	20	9	11
223	19	6	18	=	223	19	6	18
229	10	3	0	≠	229	9	1	1
235	8	5	28	=	235	8	5	28
242	18	11	15	=	242	18	11	15
243	8	7	2	≠	243	12	7	3
244	11	17	8	=	244	11	17	8
247	7	17	24	≠	247	7	17	29
249	15	8	3	=	249	15	8	3
250	7	6	12	=	250	7	6	12
251	9	10	11	=	251	9	10	11
256	7	5	5	=	256	7	5	5

Appendix B.9 A comparison of the first assessor's first and second rating of 10% of randomly selected scripts to check intra-rater reliability

Key

ROS # = randomly ordered script number
#GE/t – number of grammatical errors per text
#LE/t – number of lexical errors per text
#SE/t – number of spelling errors per text

Difference between scores

Agreement= 25/26* 100 = 96.15%

Rater 1 - First rating			
ROS #	# GE/t	# LE/t	# SE/t
4	17	6	15
6	2	6	1
7	1	8	0
8	7	9	7
13	3	4	6
18	6	6	4
29	19	9	12
47	11	10	5
52	9	9	13
53	4	8	8
64	15	6	10
66	2	5	5
70	7	10	6
81	25	17	12
89	29	23	10
110	7	1	3
139	10	3	13
141	4	7	2
151	16	8	10
170	5	6	17
178	8	4	6
216	7	17	3
234	9	4	2
236	34	13	14
241	22	14	22
256	7	5	5

Rater 1 - Second rating			
ROS #	# GE/t	# LE/t	# SE/t
4	17	6	15
6	2	6	1
7	1	8	0
8	7	9	7
13	3	4	6
18	6	6	4
29	19	9	12
47	11	10	5
52	9	9	13
53	4	8	8
64	15	6	10
66	2	5	5
70	7	10	6
81	25	17	12
89	29	23	9
110	7	1	3
139	10	3	13
141	4	7	2
151	16	8	10
170	5	6	17
178	8	4	6
216	7	17	3
234	9	4	2
236	34	13	14
241	22	14	22
256	7	5	5

Appendix B.10 Final raw data submitted for analysis

ROS #	# GE/t	# LE/t	# SE/t
1	30	18	22
2	8	8	1
3	3	8	3
4	17	6	15
5	13	13	10
6	2	6	1
7	1	8	0
8	7	9	7
9	18	9	18
10	4	3	2
11	14	10	2
12	16	8	5
13	3	4	6
14	20	16	9
15	10	6	16
16	1	7	7
17	14	14	7
18	6	6	4
19	19	8	10
20	15	13	12
21	3	5	0
22	5	6	4
23	1	2	6
24	11	7	12
25	18	15	13
26	18	8	4
27	3	4	3
28	6	4	10
29	19	9	12
30	15	6	1
31	1	0	4
32	1	1	3

ROS #	# GE/t	# LE/t	# SE/t
33	14	18	6
34	7	2	1
35	11	9	4
36	11	5	12
37	16	7	1
38	5	1	0
39	11	18	2
40	4	6	0
41	17	10	12
42	16	12	7
43	29	19	13
44	11	6	7
45	0	5	7
46	20	14	11
47	11	10	5
48	6	1	10
49	20	6	2
50	4	7	3
51	17	10	7
52	9	9	13
53	4	8	8
54	4	6	2
55	22	3	6
56	13	8	14
57	8	9	9
58	27	9	9
59	6	13	9
60	22	13	1
61	20	12	12
62	8	13	5
63	7	15	24
64	15	6	10

ROS #	# GE/t	# LE/t	# SE/t
65	14	3	0
66	2	5	5
67	2	6	0
68	4	4	2
69	8	4	11
70	7	10	6
71	36	14	17
72	9	5	2
73	6	8	5
74	8	3	5
75	14	17	5
76	11	17	9
77	9	10	7
78	17	7	0
79	10	12	8
80	6	13	19
81	25	17	12
82	10	7	5
83	8	6	5
84	9	7	4
85	7	8	14
86	17	11	5
87	3	1	1
88	9	2	2
89	29	23	10
90	9	15	6
91	13	8	12
92	14	9	4
93	3	7	5
94	10	9	9
95	21	7	5
96	16	9	11

Key

Differences between first and second marker assessment that were agreed upon through discussion

ROS #	# GE/t	# LE/t	# SE/t
97	2	7	13
98	6	7	4
99	1	5	2
100	5	5	2
101	12	5	20
102	17	12	7
103	26	13	8
104	2	10	0
105	13	18	14
106	41	11	6
107	15	14	10
108	19	5	6
109	22	8	12
110	7	1	3
111	16	9	11
112	4	1	5
113	10	11	12
114	14	19	5
115	7	12	9
116	13	7	2
117	5	7	1
118	3	3	0
119	16	12	12
120	20	9	19
121	9	0	1
122	9	4	4
123	13	19	9
124	13	5	11
125	36	24	3
126	21	15	10
127	14	14	18
128	0	2	1

ROS #	# GE/t	# LE/t	# SE/t
129	18	24	8
130	18	8	5
131	6	5	4
132	15	7	7
133	4	7	3
134	12	8	5
135	6	6	7
136	9	14	5
137	16	4	2
138	5	7	2
139	10	3	13
140	12	8	4
141	4	7	2
142	12	8	8
143	19	14	2
144	3	7	6
145	14	17	5
146	2	5	3
147	13	14	6
148	15	15	2
149	23	10	6
150	4	2	1
151	16	8	10
152	4	9	6
153	7	7	13
154	12	4	3
155	8	8	10
156	4	4	9
157	4	5	0
158	9	15	19
159	19	18	14
160	24	11	13

ROS #	# GE/t	# LE/t	# SE/t
161	13	5	18
162	24	17	3
163	3	1	2
164	0	1	0
165	11	18	8
166	15	13	1
167	11	10	13
168	2	1	4
169	19	14	12
170	5	6	17
171	18	13	13
172	2	6	1
173	1	3	0
174	8	8	6
175	15	11	9
176	13	7	4
177	8	11	8
178	8	4	6
179	2	6	5
180	1	4	0
181	20	12	3
182	13	7	16
183	2	6	12
184	17	9	22
185	8	4	4
186	6	7	3
187	20	8	10
188	14	20	6
189	21	11	12
190	5	7	8
191	9	3	2
192	29	19	9

Key

Differences between first and second marker assessment that were agreed upon through discussion

ROS #	# GE/t	# LE/t	# SE/t
193	2	3	0
194	6	4	10
195	7	4	3
196	11	9	15
197	3	2	1
198	7	5	0
199	10	5	2
200	12	5	5
201	8	12	7
202	14	12	7
203	9	6	4
204	2	6	2
205	24	25	24
206	15	8	2
207	23	24	12
208	9	6	11
209	17	13	22
210	4	3	2
211	1	2	1
212	17	4	10
213	5	14	7
214	10	19	6
215	1	1	0
216	7	17	3
217	20	9	11
218	17	15	20
219	16	3	3
220	7	11	15
221	1	10	0
222	30	24	8
223	19	6	18
224	0	2	4

ROS #	# GE/t	# LE/t	# SE/t
225	13	12	5
226	10	11	8
227	7	11	10
228	8	7	5
229	10	3	1
230	26	6	11
231	4	5	5
232	8	3	5
233	5	5	2
234	9	4	2
235	8	5	28
236	34	13	14
237	4	4	4
238	20	12	12
239	17	11	8
240	7	6	5
241	22	14	22
242	18	11	15
243	12	7	3
244	11	17	8
245	21	7	2
246	9	14	12
247	9	15	29
248	2	6	1
249	15	8	3
250	7	6	12
251	9	10	11
252	22	10	6
253	1	8	7
254	16	9	4
255	2	5	20
256	7	5	5

Key

Differences between first and second marker assessment that were agreed upon through discussion

Appendix B.11 Raw data scores reassembled (by group and writing task) for analysis

Key

C1, C2, C3, C4 = the first, second, third and fourth groups that completed collaborative writing
I1, I2, I3, I4 = the first, second, third and fourth groups that completed independent writing
Numbers 1 to 24 = the number of each student on the class register
PR= pre-test writing, PZO=post-test writing

ROS # = randomly ordered script number
#GE/t = number of grammatical errors per text
#LE/t = number of lexical errors per text
#SE/t = number of spelling errors per text
#GE/100 = number of grammatical errors per 100 words (per text)
#LE/100 = number of lexical errors per 100 words (per text)
#SE/100 = number of spelling errors per 100 words (per text)
WPT = Words per text

	ROS #	GE/t	LE/t	SE/t	GE/100	LE/100	SE/100	WPT		ROS #	GE/t	LE/t	SE/t	GE/100	LE/100	SE/100	WPT
C1-1 PR(66)	66	2	5	5	0.91	2.27	2.27	220	C1-1 PZO(224)	224	0	2	4	0.00	1.03	2.06	194
C1-4 PR(157)	157	4	5	0	2.09	2.62	0.00	191	C1-4 PZO(100)	100	5	5	2	1.93	1.93	0.77	259
C1-5 PR(54)	54	4	6	2	1.32	1.98	0.66	303	C1-5 PZO(248)	248	2	6	1	0.52	1.55	0.26	388
C1-6 PR(67)	67	2	6	0	0.82	2.45	0.00	245	C1-6 PZO(10)	10	4	3	2	1.50	1.12	0.75	267
C1-7 PR(6)	6	2	6	1	0.59	1.78	0.30	338	C1-7 PZO(23)	23	1	2	6	0.47	0.94	2.82	213
C1-11 PR(152)	152	4	9	6	1.75	3.95	2.63	228	C1-11 PZO(191)	191	9	3	2	3.24	1.08	0.72	278
C1-12 PR(250)	250	7	6	12	1.93	1.65	3.31	363	C1-12 PZO(21)	21	3	5	0	1.12	1.87	0.00	267
C1-13 PR(186)	186	6	7	3	1.94	2.26	0.97	310	C1-13 PZO(68)	68	4	4	2	1.40	1.40	0.70	286
C1-14 PR(164)	164	0	1	0	0.00	0.53	0.00	189	C1-14 PZO(128)	128	0	2	1	0.00	0.83	0.41	242
C1-15 PR(213)	213	5	14	7	1.89	5.30	2.65	264	C1-15 PZO(237)	237	4	4	4	1.92	1.92	1.92	208
C1-16 PR(211)	211	1	2	1	0.24	0.48	0.24	420	C1-16 PZO(32)	32	1	1	3	0.24	0.24	0.71	424
C1-17 PR(42)	42	16	12	7	6.61	4.96	2.89	242	C1-17 PZO(200)	200	12	5	5	4.44	1.85	1.85	270
C1-18 PR(59)	59	6	13	9	2.06	4.47	3.09	291	C1-18 PZO(7)	7	1	8	0	0.38	3.04	0.00	263
C1-19 PR(204)	204	2	6	2	0.92	2.75	0.92	218	C1-19 PZO(172)	172	2	6	1	1.06	3.19	0.53	188
C1-20 PR(12)	12	16	8	5	6.02	3.01	1.88	266	C1-20 PZO(2)	2	8	8	1	2.77	2.77	0.35	289
C1-22 PR(63)	63	7	15	24	2.22	4.75	7.59	316	C1-22 PZO(85)	85	7	8	14	2.55	2.91	5.09	275
C2-1 PR(104)	104	2	10	0	0.82	4.10	0.00	244	C2-1 PZO(197)	197	3	2	1	1.92	1.28	0.64	156
C2-2 PR(199)	199	10	5	2	5.18	2.59	1.04	193	C2-2 PZO(117)	117	5	7	1	1.98	2.77	0.40	253
C2-3 PR(65)	65	14	3	0	5.62	1.20	0.00	249	C2-3 PZO(198)	198	7	5	0	2.70	1.93	0.00	259
C2-5 PR(57)	57	8	9	9	4.00	4.50	4.50	200	C2-5 PZO(35)	35	11	9	4	4.45	3.64	1.62	247
C2-7 PR(169)	169	19	14	12	7.98	5.88	5.04	238	C2-7 PZO(202)	202	14	12	7	4.67	4.00	2.33	300
C2-8 PR(230)	230	26	6	11	11.40	2.63	4.82	228	C2-8 PZO(25)	25	18	15	13	6.38	5.32	4.61	282
C2-10 PR(193)	193	2	3	0	0.70	1.05	0.00	285	C2-10 PZO(215)	215	1	1	0	0.34	0.34	0.00	291
C2-11 PR(28)	28	6	4	10	2.71	1.81	4.52	221	C2-11 PZO(72)	72	9	5	2	3.20	1.78	0.71	281
C2-12 PR(70)	70	7	10	6	3.72	5.32	3.19	188	C2-12 PZO(189)	189	21	11	12	6.31	3.30	3.60	333
C2-14 PR(95)	95	21	7	5	9.77	3.26	2.33	215	C2-14 PZO(55)	55	22	3	6	8.21	1.12	2.24	268
C2-15 PR(90)	90	9	15	6	4.04	6.73	2.69	223	C2-15 PZO(226)	226	10	11	8	3.98	4.38	3.19	251
C2-16 PR(9)	9	18	9	18	4.77	2.39	4.77	377	C2-16 PZO(82)	82	10	7	5	3.41	2.39	1.71	293
C2-19 PR(27)	27	3	4	3	0.74	0.99	0.74	404	C2-19 PZO(156)	156	4	4	9	1.19	1.19	2.68	336
C2-21 PR(142)	142	12	8	8	5.13	3.42	3.42	234	C2-21 PZO(74)	74	8	3	5	3.23	1.21	2.02	248
C2-23 PR(251)	251	9	10	11	3.67	4.08	4.49	245	C2-23 PZO(185)	185	8	4	4	3.32	1.66	1.66	241
C2-24 PR(158)	158	9	15	19	3.63	6.05	7.66	248	C2-24 PZO(220)	220	7	11	15	1.92	3.02	4.12	364
C3-1 PR(181)	181	20	12	3	11.98	7.19	1.80	167	C3-1 PZO(106)	106	41	11	6	11.88	3.19	1.74	345
C3-2 PR(61)	61	20	12	12	11.43	6.86	6.86	175	C3-2 PZO(239)	239	17	11	8	9.04	5.85	4.26	188
C3-3 PR(17)	17	14	14	7	7.49	7.49	3.74	187	C3-3 PZO(86)	86	17	11	5	6.85	4.44	2.02	248
C3-5 PR(159)	159	19	18	14	8.84	8.37	6.51	215	C3-5 PZO(89)	89	29	23	10	6.97	5.53	2.40	416
C3-6 PR(103)	103	26	13	8	10.79	5.39	3.32	241	C3-6 PZO(71)	71	36	14	17	8.47	3.29	4.00	425
C3-8 PR(252)	252	22	10	6	11.70	5.32	3.19	188	C3-8 PZO(41)	41	17	10	12	6.72	3.95	4.74	253
C3-9 PR(15)	15	10	6	16	6.49	3.90	10.39	154	C3-9 PZO(153)	153	7	7	13	2.99	2.99	5.56	234
C3-10 PR(171)	171	18	13	13	8.22	5.94	5.94	219	C3-10 PZO(207)	207	23	24	12	7.19	7.50	3.75	320
C3-11 PR(14)	14	20	16	9	10.53	8.42	4.74	190	C3-11 PZO(145)	145	14	17	5	6.06	7.36	2.16	231
C3-12 PR(140)	140	12	8	4	6.86	4.57	2.29	175	C3-12 PZO(47)	47	11	10	5	7.75	7.04	3.52	142
C3-14 PR(218)	218	17	15	20	7.69	6.79	9.05	221	C3-14 PZO(241)	241	22	14	22	8.27	5.26	8.27	266
C3-16 PR(208)	208	9	6	11	4.86	3.24	5.95	185	C3-16 PZO(182)	182	13	7	16	5.94	3.20	7.31	219
C3-18 PR(111)	111	16	9	11	7.92	4.46	5.45	202	C3-18 PZO(109)	109	22	8	12	7.48	2.72	4.08	294
C3-20 PR(149)	149	23	10	6	11.79	5.13	3.08	195	C3-20 PZO(236)	236	34	13	14	12.59	4.81	5.19	270
C3-22 PR(238)	238	20	12	12	8.97	5.38	5.38	223	C3-22 PZO(119)	119	16	12	12	7.31	5.48	5.48	219
C3-24 PR(192)	192	29	19	9	14.01	9.18	4.35	207	C3-24 PZO(46)	46	20	14	11	8.44	5.91	4.64	237
C4-2 PR(16)	16	1	7	7	0.43	3.04	3.04	230	C4-2 PZO(22)	22	5	6	4	2.02	2.43	1.62	247
C4-5 PR(101)	101	12	5	20	4.36	1.82	7.27	275	C4-5 PZO(127)	127	14	14	18	4.78	4.78	6.14	293
C4-6 PR(84)	84	9	7	4	3.73	2.90	1.66	241	C4-6 PZO(176)	176	13	7	4	5.22	2.81	1.61	249
C4-8 PR(51)	51	17	10	7	7.83	4.61	3.23	217	C4-8 PZO(114)	114	14	19	5	4.93	6.69	1.76	284
C4-9 PR(53)	53	4	8	8	1.18	2.37	2.37	338	C4-9 PZO(122)	122	9	4	4	2.74	1.22	1.22	329
C4-10 PR(8)	8	7	9	7	2.50	3.21	2.50	280	C4-10 PZO(121)	121	9	0	1	3.30	0.00	0.37	273
C4-11 PR(137)	137	16	4	2	5.54	1.38	0.69	289	C4-11 PZO(232)	232	8	3	5	3.27	1.22	2.04	245
C4-13 PR(120)	120	20	9	19	6.15	2.77	5.85	325	C4-13 PZO(43)	43	29	19	13	8.41	5.51	3.77	345
C4-15 PR(96)	96	16	9	11	7.55	4.25	5.19	212	C4-15 PZO(29)	29	19	9	12	7.20	3.41	4.55	264
C4-17 PR(244)	244	11	17	8	3.04	4.70	2.21	362	C4-17 PZO(39)	39	11	18	2	3.20	5.23	0.58	344
C4-18 PR(234)	234	9	4	2	3.45	1.53	0.77	261	C4-18 PZO(130)	130	18	8	5	5.71	2.54	1.59	315
C4-19 PR(139)	139	10	3	13	3.62	1.09	4.71	276	C4-19 PZO(44)	44	11	6	7	2.95	1.61	1.88	373
C4-20 PR(165)	165	11	18	8	4.00	6.55	2.91	275	C4-20 PZO(147)	147	13	14	6	3.99	4.29	1.84	326
C4-22 PR(20)	20	15	13	12	6.10	5.28	4.88	246	C4-22 PZO(247)	247	9	15	29	2.54	4.24	8.19	354
C4-23 PR(161)	161	13	5	18	5.58	2.15	7.73	233	C4-23 PZO(113)	113	10	11	12	3.06	3.36	3.67	327
C4-24 PR(143)	143	19	14	2	7.48	5.51	0.79	254	C4-24 PZO(26)	26	18	8	4	7.29	3.24	1.62	247

	ROS #	GE/t	LE/t	SE/t	GE/100	LE/100	SE/100	WPT		ROS #	GE/t	LE/t	SE/t	GE/100	LE/100	SE/100	WPT
I1-1 PR(196)	196	11	9	15	5.02	4.11	6.85	219	I1-1 PZO(209)	209	17	13	22	6.72	5.14	8.70	253
I1-2 PR(123)	123	13	19	9	5.73	8.37	3.96	227	I1-2 PZO(148)	148	15	15	2	6.91	6.91	0.92	217
I1-3 PR(45)	45	0	5	7	0.00	1.61	2.26	310	I1-3 PZO(221)	221	1	10	0	0.36	3.61	0.00	277
I1-4 PR(94)	94	10	9	9	4.31	3.88	3.88	232	I1-4 PZO(77)	77	9	10	7	3.67	4.08	2.86	245
I1-6 PR(110)	110	7	1	3	3.10	0.44	1.33	226	I1-6 PZO(229)	229	10	3	1	3.83	1.15	0.38	261
I1-7 PR(64)	64	15	6	10	6.73	2.69	4.48	223	I1-7 PZO(223)	223	19	6	18	7.09	2.24	6.72	268
I1-8 PR(166)	166	15	13	1	6.44	5.58	0.43	233	I1-8 PZO(78)	78	17	7	0	6.01	2.47	0.00	283
I1-9 PR(175)	175	15	11	9	5.54	4.06	3.32	271	I1-9 PZO(162)	162	24	17	3	7.95	5.63	0.99	302
I1-10 PR(56)	56	13	8	14	5.14	3.16	5.53	253	I1-10 PZO(167)	167	11	10	13	4.10	3.73	4.85	268
I1-11 PR(243)	243	12	7	3	6.86	4.00	1.71	175	I1-11 PZO(228)	228	8	7	5	4.42	3.87	2.76	181
I1-12 PR(76)	76	11	17	9	4.18	6.46	3.42	263	I1-12 PZO(52)	52	9	9	13	4.76	4.76	6.88	189
I1-13 PR(240)	240	7	6	5	3.47	2.97	2.48	202	I1-13 PZO(219)	219	16	3	3	6.40	1.20	1.20	250
I1-15 PR(136)	136	9	14	5	4.35	6.76	2.42	207	I1-15 PZO(206)	206	15	8	2	5.98	3.19	0.80	251
I1-16 PR(134)	134	12	8	5	5.11	3.40	2.13	235	I1-16 PZO(144)	144	3	7	6	1.09	2.55	2.19	274
I1-18 PR(62)	62	8	13	5	3.49	5.68	2.18	229	I1-18 PZO(75)	75	14	17	5	4.91	5.96	1.75	285
I1-20 PR(4)	4	17	6	15	9.66	3.41	8.52	176	I1-20 PZO(187)	187	20	8	10	9.30	3.72	4.65	215
I2-1 PR(31)	31	1	0	4	0.46	0.00	1.85	216	I2-1 PZO(48)	48	6	1	10	1.85	0.31	3.08	325
I2-2 PR(233)	233	5	5	2	2.16	2.16	0.86	232	I2-2 PZO(168)	168	2	1	4	0.55	0.27	1.10	365
I2-3 PR(242)	242	18	11	15	10.71	6.55	8.93	168	I2-3 PZO(5)	5	13	13	10	7.78	7.78	5.99	167
I2-4 PR(98)	98	6	7	4	3.11	3.63	2.07	193	I2-4 PZO(3)	3	3	8	3	1.15	3.08	1.15	260
I2-7 PR(179)	179	2	6	5	1.75	5.26	4.39	114	I2-7 PZO(195)	195	7	4	3	3.07	1.75	1.32	228
I2-8 PR(99)	99	1	5	2	0.43	2.13	0.85	235	I2-8 PZO(203)	203	9	6	4	3.28	2.19	1.46	274
I2-9 PR(87)	87	3	1	1	1.09	0.36	0.36	274	I2-9 PZO(50)	50	4	7	3	2.30	4.02	1.72	174
I2-10 PR(184)	184	17	9	22	7.26	3.85	9.40	234	I2-10 PZO(235)	235	8	5	28	2.69	1.68	9.43	297
I2-11 PR(69)	69	8	4	11	2.94	1.47	4.04	272	I2-11 PZO(83)	83	8	6	5	4.52	3.39	2.82	177
I2-12 PR(216)	216	7	17	3	2.71	6.59	1.16	258	I2-12 PZO(11)	11	14	10	2	3.52	2.51	0.50	398
I2-13 PR(190)	190	5	7	8	2.99	4.19	4.79	167	I2-13 PZO(124)	124	13	5	11	6.02	2.31	5.09	216
I2-17 PR(97)	97	2	7	13	1.09	3.83	7.10	183	I2-17 PZO(255)	255	2	5	20	0.99	2.48	9.90	202
I2-18 PR(210)	210	4	3	2	2.35	1.76	1.18	170	I2-18 PZO(135)	135	6	6	7	2.55	2.55	2.98	235
I2-19 PR(38)	38	5	1	0	2.51	0.50	0.00	199	I2-19 PZO(118)	118	3	3	0	1.20	1.20	0.00	249
I2-20 PR(150)	150	4	2	1	2.34	1.17	0.58	171	I2-20 PZO(73)	73	6	8	5	1.99	2.65	1.66	302
I2-21 PR(18)	18	6	6	4	2.99	2.99	1.99	201	I2-21 PZO(133)	133	4	7	3	2.40	4.19	1.80	167
I2-14-PR(231)	231	4	5	5	1.71	2.14	2.14	234	I4-12 -PZO(146)	146	2	5	3	1.05	2.63	1.58	190
I3-2 PR(107)	107	15	14	10	8.82	8.24	5.88	170	I3-2 PZO(1)	1	30	18	22	12.10	7.26	8.87	248
I3-3 PR(115)	115	7	12	9	3.26	5.58	4.19	215	I3-3 PZO(155)	155	8	8	10	4.28	4.28	5.35	187
I3-4 PR(13)	13	3	4	6	1.52	2.02	3.03	198	I3-4 PZO(93)	93	3	7	5	1.57	3.66	2.62	191
I3-5 PR(177)	177	8	11	8	2.19	3.01	2.19	366	I3-5 PZO(37)	37	16	7	1	3.83	1.67	0.24	418
I3-7 PR(188)	188	14	20	6	5.79	8.26	2.48	242	I3-7 PZO(125)	125	36	24	3	9.76	6.50	0.81	369
I3-8 PR(170)	170	5	6	17	2.73	3.28	9.29	183	I3-8 PZO(174)	174	8	8	6	3.40	3.40	2.55	235
I3-9 PR(58)	58	27	9	9	11.49	3.83	3.83	235	I3-9 PZO(108)	108	19	5	6	8.80	2.31	2.78	216
I3-12 PR(254)	254	16	9	4	11.76	6.62	2.94	136	I3-12 PZO(19)	19	19	8	10	12.84	5.41	6.76	148
I3-13 PR(245)	245	21	7	2	10.66	3.55	1.02	197	I3-13 PZO(222)	222	30	24	8	8.13	6.50	2.17	369
I3-15 PR(227)	227	7	11	10	3.07	4.82	4.39	228	I3-15 PZO(132)	132	15	7	7	4.69	2.19	2.19	320
I3-18 PR(30)	30	15	6	1	5.05	2.02	0.34	297	I3-18 PZO(49)	49	20	6	2	5.38	1.61	0.54	372
I3-19 PR(91)	91	13	8	12	7.30	4.49	6.74	178	I3-19 PZO(160)	160	24	11	13	9.38	4.30	5.08	256
I3-20 PR(92)	92	14	9	4	7.00	4.50	2.00	200	I3-20 PZO(151)	151	16	8	10	7.48	3.74	4.67	214
I1-21 PR(217)	217	20	9	11	7.72	3.47	4.25	259	I1-21 PZO(154)	154	12	4	3	4.98	1.66	1.24	241
I1-22 PR(24)	24	11	7	12	3.81	2.42	4.15	289	I1-22 PZO(249)	249	15	8	3	5.84	3.11	1.17	257
I4-2 PR(183)	183	2	6	12	0.96	2.87	5.74	209	I4-2 PZO(253)	253	1	8	7	0.41	3.28	2.87	244
I4-3 PR(180)	180	1	4	0	0.35	1.40	0.00	286	I4-3 PZO(138)	138	5	7	2	1.18	1.65	0.47	423
I4-5 PR(60)	60	22	13	1	8.80	5.20	0.40	250	I4-5 PZO(33)	33	14	18	6	5.00	6.43	2.14	280
I4-6 PR(80)	80	6	13	19	1.55	3.37	4.92	386	I4-6 PZO(194)	194	6	4	10	2.38	1.59	3.97	252
I4-7 PR(81)	81	25	17	12	10.04	6.83	4.82	249	I4-7 PZO(205)	205	24	25	24	7.10	7.40	7.10	338
I4-8 PR(129)	129	18	24	8	6.00	8.00	2.67	300	I4-8 PZO(105)	105	13	18	14	4.55	6.29	4.90	286
I4-9 PR(131)	131	6	5	4	3.00	2.50	2.00	200	I4-9 PZO(173)	173	1	3	0	0.53	1.58	0.00	190
I4-10 PR(256)	256	7	5	5	4.12	2.94	2.94	170	I4-10 PZO(126)	126	21	15	10	9.09	6.49	4.33	231
I4-11 PR(246)	246	9	14	12	3.37	5.24	4.49	267	I4-11 PZO(201)	201	8	12	7	3.64	5.45	3.18	220
I4-12 PR(102)	102	17	12	7	6.32	4.46	2.60	269	I4-12 PZO(214)	214	10	19	6	3.46	6.57	2.08	289
I4-13 PR(40)	40	4	6	0	1.90	2.84	0.00	211	I4-13 PZO(79)	79	10	12	8	3.70	4.44	2.96	270
I4-15 PR(141)	141	4	7	2	1.03	1.79	0.51	390	I4-15 PZO(34)	34	7	2	1	2.51	0.72	0.36	279
I4-16 PR(88)	88	9	2	2	4.31	0.96	0.96	209	I4-16 PZO(178)	178	8	4	6	3.64	1.82	2.73	220
I4-17 PR(163)	163	3	1	2	1.47	0.49	0.98	204	I4-17 PZO(112)	112	4	1	5	1.42	0.36	1.78	281
I4-18 PR(225)	225	13	12	5	6.50	6.00	2.50	200	I4-18 PZO(116)	116	13	7	2	7.78	4.19	1.20	167
I4-19 PR(212)	212	17	4	10	9.55	2.25	5.62	178	I4-19 PZO(36)	36	11	5	12	5.64	2.56	6.15	195

Appendix C.1 Identification of words per text (WPT)

Sample

Childhood obesity is a seemingly increasing problem in many countries. It can lead to a series of risk factors in future life and effect your daily life style.

On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of others. It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician.

Obesity is a major problem for all ages. However children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

218 words

Appendix C.2 Analysis of average sentence length

Sample

12 Sentences Average 18.17 words (SD=7.36)

Childhood obesity is a seemingly increasing problem in many countries.

It can lead to a series of risk factors in future life and effect your daily life style.

On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast.

This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it.

Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of other.

It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices.

One of them is starving themselves because they believe it will make them magically thinner.

Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician.

Obesity is a major problem for all ages.

However children could victimize themselves easier for this physical condition.

If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Appendix C.3 Identification of the number of simple, compound and complex sentences per text

Sample

SENTENCES	12
[SIMPLE]	7
[COMPOUND]	1
[COMPLEX]	4

12 sentences found.

S# Sentence

1 Childhood obesity is a seemingly increasing problem in many countries. **[SIMPLE]**

2 It can lead to a series of risk factors in future life and effect your daily life style. **[SIMPLE]**

3 On of the many consequences of obesity, particularly in childhood, is the withdrawal from everyday activities due to the hardship of performing physical fast. **[SIMPLE]**

4 This furtherly affects your mental condition as you realize it takes a lot of effort to do physical tasks, including exercising, so you don't do it. **[COMPLEX]**

5 Doing regular exercise plays an important role in staying fit or leading yourself away from obesity. **[SIMPLE]**

6 Another consequence of child hood obesity is your image in front of others. **[SIMPLE]**

7 It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. **[COMPOUND]**

8 One of them is starving themselves because they believe it will make them magically thinner. **[COMPLEX]**

9 Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weigh size, one of them is to see a dietician. **[COMPLEX]**

10 Obesity is a major problem for all ages. **[SIMPLE]**

11 However children could victimize themselves easier for this physical condition. **[SIMPLE]**

12 It should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves. **[COMPLEX]**

Identification key

1. A simple sentence is a sentence that contains one *independent clause*.

2. A compound sentence is a sentence that contains two *independent clauses* connected by a **coordinating conjunction**.

3. A complex sentence is a sentence that contains at least one *independent* and dependent clause.

Appendix C.4 Identification t-units

Sample

14 T-units

1. Childhood obesity is a seemingly increasing problem in many countries.
2. It can lead to a series of risk factors in future life and effect your daily life style.
3. On of the many consequences of obesity, particularly in childhood, is the withdrawal from everyday activities due to the hardship of performing physical fast.
4. This furtherly affects your mental condition as you realize it takes a lot of effort to do physical tasks, including exercising.
5. So you don't do it.
6. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.
7. Another consequence of childhood obesity is your image in front of other.
8. It's very common that obese children tend to get bullied or made fun of.
9. And it can drive the victims to making bad choices.
10. One of them is starving themselves because they believe it will make them magically thinner.
11. Although obesity does commonly come from overeating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician.
12. Obesity is a major problem for all ages.
13. However children could victimize themselves easier for this physical condition.
14. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Appendix C.5 Identification of words per t-unit

Sample

14 T-units
Average 15.57 words (SD=7.19)

1. Childhood obesity is a seemingly increasing problem in many countries.
2. It can lead to a series of risk factors in future life and effect your daily life style.
3. On of the many consequences of obesity, particularly in childhood, is the withdrawal from everyday activities due to the hardship of performing physical fast.
4. This furtherly affects your mental condition as you realize it takes a lot of effort to do physical tasks, including exercising.
5. So you don't do it.
6. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.
7. Another consequence of childhood obesity is your image in front of other.
8. It's very common that obese children tend to get bullied or made fun of.
9. And it can drive the victims to making bad choices.
10. One of them is starving themselves because they believe it will make them magically thinner.
11. Although obesity does commonly come from overeating or not eating right there are certain manners to follow towards improving your weigh size, one of them is to see a dietician.
12. Obesity is a major problem for all ages.
13. However children could victimize themselves easier for this physical condition.
14. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Appendix C.6 Calculation of mean length of noun phrase

Childhood obesity is a seemingly increasing problem in many countries. it can lead to a series of risk factors in future life and effect young daily lifestyle. On of the many consequences of obesity, particularly in childhood, is the withdrawal from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity. Another consequence of childhood obesity is your image in front of others. it's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from overeating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician. Obesity is a major problem for all ages, however children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibilities put upon themselves.

Analysis Result

1. risk factors

2. future life

3. young daily lifestyle

4. everyday activities

6. mental condition

7. physical tasks

8. important role

9. childhood obesity

10. obese children

11. bad choices

12. certain manners

13. weight size

14. major problem

15. physical condition

Mean = 2.06

Appendix C.7 Assessment of lexical diversity

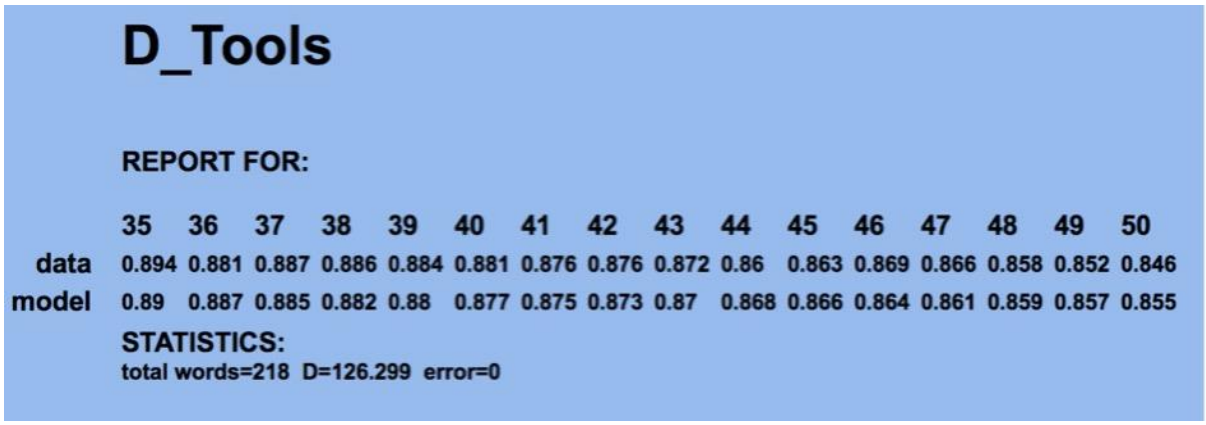
Sample

Childhood obesity is a seemingly increasing problem in many countries. it can lead to a series of risk factors in future life and effect your daily lifestyle.

On of the many consequences of obesity, particularly in childhood, is the withdrawal from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of childhood obesity is your image in front of others. it's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from overeating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician.

Obesity is a major problem for all ages, however children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibilities put upon themselves.



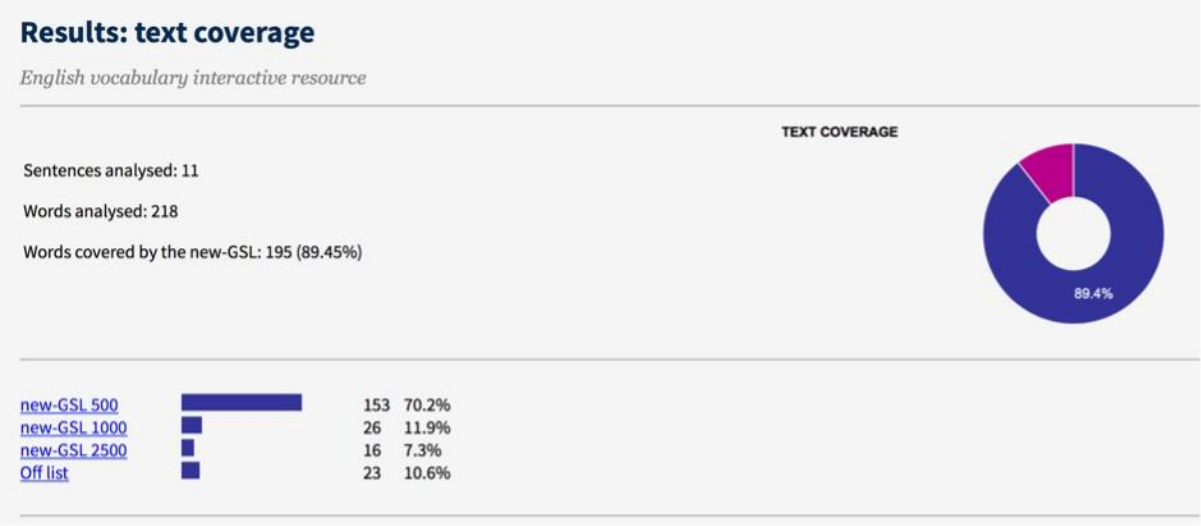
Appendix C.8 Assessment of lexical sophistication

Childhood obesity is a seemingly increasing problem in many countries. it can lead to a series of risk factors in future life and effect your daily lifestyle.

On of the many consequences of obesity, particularly in childhood, is the withdrawal from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of childhood obesity is your image in front of others. it's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from overeating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician.

Obesity is a major problem for all ages, however children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibilities put upon themselves.



Appendix C.9 Identification of the number of errors (by type) per text

Sample

Childhood obesity is a seemingly increasing problem in many countries. It can lead to a series of risk factors in future life and effect your daily life style.

On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of others. It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magicallly thinner. Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weight size, one of them is to see a dietician.

Obesity is a major problem for all ages. However children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Error type	Count
Grammatical error	2
Lexical error	6
Error in spelling	3
Total errors per text	11

Appendix C.10 Identification of the number of error-free t-units per text

Sample

14 T-units

1. Childhood obesity is a seemingly increasing problem in many countries.
2. It can lead to a series of risk factors in future life and effect your daily life style.
3. On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast.
4. This furtherly affects your mental condition as you realize it takes a lot of effort to do physical tasks, including exercising.
5. So you don't do it.
6. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.
7. Another consequence of childhood obesity is your image in front of others.
8. It's very common that obese children tend to get bullied or made fun of.
9. And it can drive the victims to making bad choices.
10. One of them is starving themselves because they believe it will make them magically thinner.
11. Although obesity does commonly come from overeating or not eating right there are certain manners to follow towards improving your weigh size, one of them is to see a dietician.
12. Obesity is a major problem for all ages.
13. However children could victimize themselves easier for this physical condition.
14. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Error-free t-units = 6/14 T-units

1. Childhood obesity is a seemingly increasing problem in many countries.
2. So you don't do it.
3. Another consequence of childhood obesity is your image in front of other.
4. It's very common that obese children tend to get bullied or made fun of.
5. One of them is starving themselves because they believe it will make them magically thinner.
6. Obesity is a major problem for all ages.

Appendix C.11 Identification of words per error-free t-unit

Sample

Error-free t-units = 6
Average 10.67 words (SD=3.78)

1. Childhood obesity is a seemingly increasing problem in many countries.
2. So you don’t do it.
3. Another consequence of childhood obesity is your image in front of other.
4. It’s very common that obese children tend to get bullied or made fun of.
5. One of them is starving themselves because they believe it will make them magically thinner.
6. Obesity is a major problem for all ages.

Appendix C.12 The number of correct/incorrect cohesive conjunctions per text

Sample

Childhood obesity is a seemingly increasing problem in many countries. it can lead to a series of risk factors in future life and effect your daily life style.
On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of others. it's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weigth size, one of them is to see a dietician.

Obesity is a major problem for all ages. However children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Script	Correct conjunction	Incorrect conjunction
SAMPLE	15	1

Appendix C.13 The number of correct/incorrect noun-reference pairs per text

Sample

Childhood obesity is a seemingly increasing problem in many countries. It can lead to a series of risk factors in future life and effect your daily life style.
On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of others. It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weigth size, one of them is to see a dietician.
Obesity is a major problem for all ages. However children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

# Correct noun-references	11
# Incorrect noun-references	1

Key

Noun or pronoun

Reference (used correctly)

The reference does not agree with the noun or pronoun that it refers to.

The reference refers to a noun or pronoun that is not mentioned.

Appendix C.14 The number of correct/incorrect noun/synonym pairs per text

Sample

Childhood obesity is a seemingly increasing problem in many countries. It can lead to a series of risk factors in future life and effect your daily life style.

On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of others. It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weigth size, one of them is to see a dietician.

Obesity is a major problem for all ages. However children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Correct synonymous pairing	2
Incorrect synonymous pairing	0

Key

The writer uses two words that are synonymous.

One of the words is not synonymous with the word it refers to, or there are errors in one of the words used.

Appendix C.15 Identification of sentences that needed to be reread, were difficult to understand, that were not connected, or that did not cause difficulty for the reader per text

Sample

Childhood obesity is a seemingly increasing problem in many countries. It can lead to a series of risk factors in future life and effect your daily life style.

On of the many consequences of obesity, particularly in childhood, is the withdrawl from everyday activities due to the hardship of performing physical fast. This furtherly affects your mental condition as you realise it takes a lot of effort to do physical tasks, including exercising, so you don't do it. Doing regular exercise plays an important role in staying fit or leading yourself away from obesity.

Another consequence of child hood obesity is your image in front of others. It's very common that obese children tend to get bullied or made fun of, and it can drive the victims to making bad choices. One of them is starving themselves because they believe it will make them magically thinner. Although obesity does commonly come from over eating or not eating right there are certain manners to follow towards improving your weigth size, one of them is to see a dietician.

Obesity is a major problem for all ages. However children could victimize themselves easier for this physical condition. If should be taken care of while you are still young because in the future, there will be more responsibities put upon themselves.

Total sentences	12
a. Sentences that need to be re-read	2
b. Sentences that are difficult to understand	3
c. Sentences that are not connected to others in the text	0
Sentences that do not cause difficulty for the reader (Total sentences – a, b and c)	7

Appendix C.16 Measures of dispersion of pre and post-test writing

Accuracy

	N	Min.	Max.	Mean	SD	Skewness			Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Z	Statistic	Std. Error	Z
Grammatical errors/100 words **pre**	128	0	14.01	4.87	3.31	0.60	0.214	2.82	-0.44	0.425	-1.04
Grammatical errors/100 words **post**	128	0	12.84	4.46	2.95	0.63	0.214	2.93	-0.09	0.425	-0.21
Lexical errors /100 words **pre**	128	0	9.18	3.82	2.08	0.44	0.214	2.07	-0.4	0.425	-0.94
Lexical errors /100 words **post**	128	0	7.78	3.29	1.89	0.53	0.214	2.50	-0.497	0.425	-1.17
Spelling errors/100 words **pre**	128	0	10.39	3.26	2.33	0.64	0.214	3.00	-0.058	0.425	-0.14
Spelling errors/100 words **post**	128	0	9.90	2.75	2.28	1.09	0.214	5.11	0.726	0.425	1.71
Ratio of error-free t-units **pre**	128	0	90.00	30.39	22.37	0.62	0.214	2.90	-0.426	0.425	-1.00
Ratio of error-free t-units **post**	128	0	89.47	31.60	21.75	0.56	0.214	2.63	-0.612	0.425	-1.44

Fluency

	N	Min.	Max.	Mean	SD	Skewness			Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Z	Statistic	Std. Error	Z
Words per script **pre**	128	114	420	237.73	56.24	1.01	0.214	4.72	1.221	0.425	2.87
Words per script **post**	128	142	425	267.87	61.78	0.528	0.214	2.47	0.193	0.425	0.45
Words per t-unit **pre**	128	9.06	24.83	15.33	3.03	0.675	0.214	3.15	0.39	0.425	0.92
Words per t-unit **post**	128	10.38	23	16.15	2.83	0.528	0.214	2.47	-0.144	0.425	-0.34
Words per error-free t-unit **pre**	128	0	22	10.50	4.21	-0.535	0.214	-2.50	1.1	0.425	2.59
Words per error-free t-unit **post**	128	0	23.75	11.92	4.40	-0.489	0.214	-2.29	1.803	0.425	4.24

Lexical complexity

	N	Min.	Max.	Mean	SD	Skewness			Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Z	Statistic	Std. Error	Z
Lexical diversity **pre**	128	29.1	147.2	77.23	23.36	0.534	0.214	2.50	0.214	0.425	0.50
Lexical diversity **post**	128	38.6	149.9	81.35	19.39	0.613	0.214	2.86	1.159	0.425	2.73
GSL-500 words **pre**	128	66.1	87.8	77.62	4.39	-0.141	0.214	-0.66	-0.424	0.425	-1.00
GSL-500 words **post**	128	64.6	85.7	76.23	4.13	-0.385	0.214	-1.80	0.092	0.425	0.22
GSL-1000 words **pre**	128	2.3	15.2	7.62	2.39	0.52	0.214	2.43	0.594	0.425	1.40
GSL-1000 words **post**	128	3.7	15.9	8.61	2.26	0.397	0.214	1.86	0.46	0.425	1.08
GSL-2500 words **pre**	128	1.7	14.3	7.67	2.50	0.336	0.214	1.57	0.35	0.425	0.82
GSL-2500 words **post**	128	4	12.8	7.67	1.82	0.354	0.214	1.65	-0.284	0.425	-0.67

Syntactic complexity

	N	Min.	Max.	Mean	SD	Skewness			Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Z	Statistic	Std. Error	Z
Words per sentence **pre**	128	11	31.67	19.13	4.43	0.623	0.214	2.91	-0.12	0.425	-0.28
Words per sentence **post**	128	11.38	30.75	19.74	4.15	0.611	0.214	2.86	-0.214	0.425	-0.50
Ratio /simple sentences **pre**	128	14.29	96.3	56.15	18.18	-0.111	0.214	-0.52	-0.456	0.425	-1.07
Ratio /simple sentences **post**	128	0	100	55.77	17.42	-0.342	0.214	-1.60	0.233	0.425	0.55
Ratio /compound sentences **pre**	128	0	50	15.20	12.39	0.672	0.214	3.14	-0.169	0.425	-0.40
Ratio / compound sentences **post**	128	0	38.46	12.97	10.17	0.528	0.214	2.47	-0.487	0.425	-1.15
Ratio /complex sentences **pre**	128	0	71.43	28.65	16.80	0.479	0.214	2.24	-0.335	0.425	-0.79
Ratio /complex sentences **post**	128	0	80	31.26	16.68	0.67	0.214	3.13	0.288	0.425	0.68

Coherence

	N	Min.	Max.	Mean	SD	Skewness			Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Z	Statistic	Std. Error	Z
Words per sentence **pre**	128	11	31.67	19.13	4.43	0.623	0.214	2.91	-0.12	0.425	-0.28
Words per sentence **post**	128	11.38	30.75	19.74	4.15	0.611	0.214	2.86	-0.214	0.425	-0.50
Ratio /simple sentences **pre**	128	14.29	96.3	56.15	18.18	-0.111	0.214	-0.52	-0.456	0.425	-1.07
Ratio /simple sentences **post**	128	0	100	55.77	17.42	-0.342	0.214	-1.60	0.233	0.425	0.55
Ratio /compound sentences **pre**	128	0	50	15.20	12.39	0.672	0.214	3.14	-0.169	0.425	-0.40
Ratio / compound sentences **post**	128	0	38.46	12.97	10.17	0.528	0.214	2.47	-0.487	0.425	-1.15
Ratio /complex sentences **pre**	128	0	71.43	28.65	16.80	0.479	0.214	2.24	-0.335	0.425	-0.79
Ratio /complex sentences **post**	128	0	80	31.26	16.68	0.67	0.214	3.13	0.288	0.425	0.68

Cohesion

	N	Min.	Max.	Mean	SD	Skewness			Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Z	Statistic	Std. Error	Z
Cohesive conjunctions/ 100 words **pre**	128	3.59	14.5	9.30	2.22	0.098	0.214	0.46	-0.097	0.425	-0.23
Cohesive conjunctions/ 100 words **post**	128	4.63	16.49	9.88	2.11	0.259	0.214	1.21	0.297	0.425	0.70
Noun reference pairs/ 100 words **pre**	128	2.07	12.3	6.61	2.27	0.122	0.214	0.57	-0.526	0.425	-1.24
Noun reference pairs/ 100 words **post**	128	1.44	11.65	6.10	2.30	0.174	0.214	0.81	-0.572	0.425	-1.35
Noun synonym pairs/ 100 words **pre**	128	0	5.26	1.63	1.05	0.633	0.214	2.96	0.473	0.425	1.11
Noun synonym pairs/ 100 words **post**	128	0	5.96	1.83	1.12	0.96	0.214	4.49	1.249	0.425	2.94

Key

Z scores relating to skewness or kurtosis **within** the range +/–3.29 indicative of normality for samples >50 and < 300 (Aryadoust 2020)

Z scores relating to skewness or kurtosis **outside** the range +/–3.29 indicative of normality for samples >50 and < 300 (Aryadoust 2020)

Appendix D.1 Simple, compound and complex sentence identification guide

Identification key

1. A simple sentence is a sentence that contains one *independent clause*.

2. A compound sentence is a sentence that contains two *independent clauses* connected by a **coordinating conjunction**.

3. A complex sentence is a sentence that contains at least one *independent* and dependent clause.

Appendix D.2 Correct/incorrect cohesive conjunction guide

Correct cohesive conjunctions are expressions to add, sequence, contrast, compare, qualify, and illustrate ideas that are used correctly.

Examples

Adding

In addition to playing football, he **also** plays tennis **and** basketball.

Sequencing

First of all, I wake up **then** I brush my teeth.

Contrasting

Unlike his brother, he usually arrives on time.

Comparing

He speaks two language **like** his sister.

Qualifying

He plays football a lot, **but** he doesn't like to watch it.

Illustrating

He plays many sports, such as basketball, football, and tennis.

Incorrect cohesive conjunctions are those which do not correctly achieve their communicative purpose, or those if written or spelled incorrectly, the reader has to guess what the writer is trying to say.

Examples

He loves playing tennis **and** he doesn't like watching it (adding not qualifying and thus confusing)

There are many people is London. **On the other hand,** it is really crowded (Contrasting not adding: making the writer's message unclear).

Fist they like those jobs.

He went to the park **and** people were running everywhere.

Appendix D.3 Correct/incorrect noun reference pair identification guide

Identification key (Please highlight the following)

Noun or pronoun

Reference (used correctly) is a word that correctly refers to a noun, e.g. the book, it, this, that

The reference does not agree with the noun or pronoun that it refers to.

The reference refers to a noun or pronoun that is not mentioned.

Appendix D.4 Correct/incorrect noun synonym pair identification guide

Identification key

The writer uses two words that are synonymous.

One of the words is not synonymous with the word it refers to, or there are errors in one of the words used.

Appendix D.5 Guide to identifying sentences that need to be reread, are difficult to understand and that are not connected to others in the text

Identification key

Sentences that need to be reread are sentences that cannot be fully understood at first glance and that need to be reread to understand what the writer wants to express.

Sentences that are difficult to understand are sentences that cannot be fully understood even after they have been reread a number of times. After reading, it is not possible to fully understand what the writer is trying to say, or an educated guess must be taken at the writer's intended meaning.

Sentences that are not connected to others in the text are incongruous sentences that are out of synch with other sentences, or that have no logical connection with those around them.

Appendix D.6 Guide to identifying errors in writing scripts

Below are some examples of grammatical, lexical, and spelling errors that you may encounter. I have also provided notes on how to count the errors that you identify in each script.

Grammatical errors (Please highlight in green)		
Agreement	Subject/verb	He **like** football.
	Verb/noun	There are many **problem**.
	Pronoun/antecedent	**Students** pass most of **his** exams.
Plural/singular	Article/noun agreement	He has a **pens**. He has many **friend.**
	Countable/uncountable	He has **many** money. He has **a** milk.
Articles	Unnecessary inclusion	I like **the** swimming.
	Missing article	I have ˅ pen.
	a/an	I have **a** umbrella
	Definite/indefinite article	Do you have **the** brother?
	Article/noun agreement	I have **a** friends.
Demonstratives	Agreement	**This** books are mine
Participles	Incorrect participle	He is **gone** to the park
	Participle with missing auxiliary verb	He ˅ going to the park
Adjectives	ed/ing adjective errors	I am **interesting** in the movie.
	Making adjectives plural	These subjects are **difficults**
Adverbs	Use of adjectives/ omission	He talks **loud**.
	Incorrect use	This cheese smells **badly**.
Verbs (see agreement, and participles)	Incorrect tense	Yesterday, I **work** a lot.
	Incorrect conjugation	He **goed** to school. He **eated** a lot.
	Missing auxiliary	They ˅ not go to school
	verb + infinitive or verb + ing	I like **go** to the park. I adore **to watch** movies.
	Modal verb + bare infinitive	I must **to** go to work.
Nouns (see articles)	Pluralization of uncountable nouns	I need some **informations**. I have a foods.
	Inclusion of unnecessary article with nouns	**The** money is necessary to live.
	Capitalization	I speak **arabic**.
Pronouns	Confusing personal and possessive pronouns	A friend of **me**.
Pronoun/antecedent agreement	Inclusion of unnecessary pronouns	My brother **he** is rich
	Confusing relative pronouns	The man **which** lives near my house.
Prepositions*	Missing preposition	I am worried ˅ problem.
	Preposition + verb error	I am interested in **study** French.

	Inclusion of unnecessary preposition)	She met **with** me.
Comparatives and superlatives	Doubling comparatives And superlatives	She is **more happier** than me.
Word order	Incorrect word order	He played **yesterday** tennis.

Lexical errors (Please highlight in yellow)
Semantic errors – when the writer uses a word that does not make sense, or that does not express the writer's ideas clearly.
Some people can't **take** a day without having fast food.
The most **category** who eat fast food are the children.
This issue is increasing **by days.**
Word formation errors – when the writer uses a word that is not recognized in the English language. This may include the formation of words with incorrect prefixes and suffixes.
People can join a **trustable** gym.
They use **combins** a lot.
Thics is a big problem.
Collocational errors- the use of words that do not collocate with those around them.
Another **big** reason why obesity is so common is the consumption of fast food.
There is little awareness **to** what's going on.
One **reason** of obesity is eating too much.

Spelling

Spelling errors (Please highlight in purple)
Spelling errors- the use of recognizable words** that are spelt incorrectly.
Morover, junk food is a problem.

Notes

1. A word may have two different types of grammatical errors. This is counted as **one error**.

   Example- Yesterday, he **go** to the bank. (this is counted as one error even though there is a subject/verb agreement error and incorrect use of tense).

2. A word or expression may have different two types of errors (e.g. grammatical and spelling). This is counted as **two errors** and is highlighted like this.

Parents afects what children eat.(this has one spelling error, i.e. **af**ects and one grammatical error related to subject/verb agreement, i.e. parents affect**s**).

3. Missing or the unnecessary inclusion of prepositions is counted as a grammatical error. Use of incorrect prepositions that change the intended meaning, or that cause collocational errors are counted as lexical errors.*

4. Words that are unrecognizable, or where you can only guess what the writer is trying to say are counted as a lexical error and not as a spelling error.**

Appendix E.1– Sample of collaborative writing dialogue (abbreviated)

speakers

student 1 = S1

student 2 = S2

Instructor = I

key

[time]

Italic script = translated Arabic dialog

S1 [0:50] you're done?

S2 [0:52] yea

I [0:53] Ladies, when you are ready... when you have a clear idea… don't make the summary too long, right?... Just the main ideas… and that it's it. *go head*….

S1 [1:19] do you want to write?

S2 [1:20] it's okay… so… first I can say that food is considered…

S1 [1:42] luxury...

I [1:45] ladies, I have put an example on the bored if you want to have a quick look.

S2 [1:52] important for survival in the past... so I will start up with like…

S1 [2:38] was kind of expensive

S2 [2:39] I know

S1 [2:40] and was hard to find… to get…

S2 [2:42] it was very rare and in scarce… food such as imported food were considered a luxury and not everyone could afford them...

S1 [3:49] anyone who was lucky enough to get these would normally keep them aside for special occasions…

S2 [4:10] get these…

S1 [4:20] anyone one who is lucky enough to get these… normally keep them aside for special occasions…

S2 [4:56] we can talk about other means of food was through hunting through the desert…

S1 [5:34] nowadays, everyone worries about obesity and cholesterol… so the simple food they used to eat before is considered healthy… nowadays, where everyone worries about obesity and cholesterol, simple food in the past or in my childhood?

S2 [6:10] in the past…

S1 [6:11] in the past would actually be considered healthy food… cholesterol… the simple food they used to eat in the past was actually considered healthy…

I [6:55] that's the summary?

S2 [6:56] oh yea... I didn't put the family name…

S1 [7:20] what's popular in the UAE?

S2 [7:22] mmm… hreees

S1 [7:30] it's not that popular … we only eat it in Ramadan.

S2 [7:40] I don't know

S1 [7:41] briani ?

S2 [7:42] yea

S1 [7:43] briani… it's like a daily thing… yea

S2 [7:47] they serve it even like… everywhere…

S1 [7:57] okay…so first we have to write what is briyani… it's a…

S2 [8:02] it's a savory food that consist of

S1 [8:07] herbs

S2 [8:09] spices

S1 [8:11] mixed with rice

S2 [8:13] how do you spell briyani

S1 [8:16] b i…bI r y a n i

S2 [8:20] biryani… briyani is a

S1 [8:26] is a mixture of spiced and herbs and rice?

S2 [8:43] I have no idea

S1 [8:45] with rice.

S2 [8:49] is poplar food in the UAE … Isn't there meat?... I think

S1 [8:52] mumble

S2 [8:55] in the UAE… of the… that...

S1 [9:04] that consist of rice mixed with… what do we say?

S2 [9:10] herbs

S1 [9:12] yea… and spices… now we just facts

S2 [9:30] I guess

S1 [9:38] bryani is mostly served when… it's actually a daily thing

S2 [9:45] we can actually start by saying … bryani is a traditional food that was eaten in the past…

S1 [9:50] and is still ongoing these days…it is mostly severed in occasion such as gathering and Ramadan…. Or Eid

S2 [10:40] I guess

S1 [10:43] but actually it's daily

S2 [10:45] briyani is a… it is served in special occasion as well as…

S1 [11:45] what else?

S2 [12:01] it's a nutritional…

S1 [12:04] it's a nutritional kind of dish… it consist of many healthy…

Appendix F.1 Samples of collaborative dialogue assessed by assessor 1 and assessor 2 (n=94)

	F-LREs	L-LREs	M-LREs	D-LREs		F-LREs	L-LREs	M-LREs	D-LREs
Sample 1					Sample 48				
Sample 2					Sample 49				
Sample 3					Sample 50				
Sample 4					Sample 51				
Sample 5					Sample 52				
Sample 6					Sample 53				
Sample 7					Sample 54				
Sample 8					Sample 55				
Sample 9					Sample 56				
Sample 10					Sample 57				
Sample 11					Sample 58				
Sample 12					Sample 59				
Sample 13					Sample 60				
Sample 14					Sample 61				
Sample 15					Sample 62				
Sample 16					Sample 63				
Sample 17					Sample 64				
Sample 18					Sample 65				
Sample 19					Sample 66				
Sample 20					Sample 67				
Sample 21					Sample 68				
Sample 22					Sample 69				
Sample 23					Sample 70				
Sample 24					Sample 71				
Sample 25					Sample 72				
Sample 26					Sample 73				
Sample 27					Sample 74				
Sample 28					Sample 75				
Sample 29					Sample 76				
Sample 30					Sample 77				
Sample 31					Sample 78				
Sample 32					Sample 79				
Sample 33					Sample 80				
Sample 34					Sample 81				
Sample 35					Sample 82				
Sample 36					Sample 83				
Sample 37					Sample 84				
Sample 38					Sample 85				
Sample 39					Sample 86				
Sample 40					Sample 87				
Sample 41					Sample 88				
Sample 42					Sample 89				
Sample 43					Sample 90				
Sample 44					Sample 91				
Sample 45					Sample 92				
Sample 46					Sample 93				
Sample 47					Sample 94				

Appendix F.2 Identification of LREs in collaborative dialogue reassessed by assessor 1 (n=10)

	F-LREs	L-LREs	M-LREs	D-LREs		F-LREs	L-LREs	M-LREs	D-LREs
Sample 1					Sample 48				
Sample 2					Sample 49				
Sample 3					Sample 50				
Sample 4					Sample 51				
Sample 5					Sample 52				
Sample 6					Sample 53				
Sample 7					Sample 54				
Sample 8					Sample 55				
Sample 9					Sample 56				
Sample 10					Sample 57				
Sample 11					Sample 58				
Sample 12					Sample 59				
Sample 13					Sample 60				
Sample 14					Sample 61				
Sample 15					Sample 62				
Sample 16					Sample 63				
Sample 17					Sample 64				
Sample 18					Sample 65				
Sample 19					Sample 66				
Sample 20					Sample 67				
Sample 21					Sample 68				
Sample 22					Sample 69				
Sample 23					Sample 70				
Sample 24					Sample 71				
Sample 25					Sample 72				
Sample 26					Sample 73				
Sample 27					Sample 74				
Sample 28					Sample 75				
Sample 29					Sample 76				
Sample 30					Sample 77				
Sample 31					Sample 78				
Sample 32					Sample 79				
Sample 33					Sample 80				
Sample 34					Sample 81				
Sample 35					Sample 82				
Sample 36					Sample 83				
Sample 37					Sample 84				
Sample 38					Sample 85				
Sample 39					Sample 86				
Sample 40					Sample 87				
Sample 41					Sample 88				
Sample 42					Sample 89				
Sample 43					Sample 90				
Sample 44					Sample 91				
Sample 45					Sample 92				
Sample 46					Sample 93				
Sample 47					Sample 94				

Key: Scripts reassessed by the first assessor

Appendix F.3 Identification of LREs in samples of collaborative dialogue (n=94) assessed by assessor 1

	F-LREs	L-LREs	M-LREs	D-LREs		F-LREs	L-LREs	M-LREs	D-LREs
Sample 1	0	4	1	4	Sample 48	2	6	2	7
Sample 2	1	4	0	4	Sample 49	0	9	1	3
Sample 3	2	4	1	1	Sample 50	1	9	0	4
Sample 4	0	3	2	2	Sample 51	3	10	2	7
Sample 5	0	1	0	0	Sample 52	1	10	1	2
Sample 6	3	6	3	5	Sample 53	0	3	1	0
Sample 7	4	5	3	2	Sample 54	1	3	2	0
Sample 8	4	10	7	7	Sample 55	1	7	1	6
Sample 9	0	4	3	1	Sample 56	1	0	1	0
Sample 10	0	2	1	0	Sample 57	1	4	2	0
Sample 11	1	13	8	4	Sample 58	1	7	1	1
Sample 12	0	0	0	1	Sample 59	1	8	0	2
Sample 13	2	9	0	0	Sample 60	2	3	0	1
Sample 14	1	7	3	1	Sample 61	1	10	2	3
Sample 15	2	6	2	5	Sample 62	0	14	1	1
Sample 16	0	7	0	0	Sample 63	1	6	0	2
Sample 17	0	8	0	6	Sample 64	1	4	1	0
Sample 18	2	8	0	2	Sample 65	1	6	5	2
Sample 19	1	4	0	0	Sample 66	1	11	2	2
Sample 20	0	12	1	0	Sample 67	0	3	2	2
Sample 21	1	5	2	0	Sample 68	0	0	0	0
Sample 22	2	6	4	4	Sample 69	0	6	1	1
Sample 23	1	5	4	4	Sample 70	2	8	3	5
Sample 24	3	2	1	3	Sample 71	0	4	2	0
Sample 25	1	4	2	2	Sample 72	0	1	1	0
Sample 26	0	2	3	0	Sample 73	0	6	2	2
Sample 27	2	4	1	1	Sample 74	1	6	4	2
Sample 28	0	6	2	2	Sample 75	0	1	0	0
Sample 29	0	1	0	0	Sample 76	0	4	0	1
Sample 30	1	6	2	1	Sample 77	2	9	2	1
Sample 31	1	4	0	3	Sample 78	0	4	1	1
Sample 32	1	9	10	0	Sample 79	0	4	1	2
Sample 33	0	2	0	0	Sample 80	2	4	0	1
Sample 34	2	5	0	1	Sample 81	2	10	3	9
Sample 35	0	3	0	3	Sample 82	0	7	3	1
Sample 36	2	6	0	1	Sample 83	3	5	1	2
Sample 37	0	1	1	2	Sample 84	2	8	0	3
Sample 38	0	4	0	1	Sample 85	0	6	0	4
Sample 39	2	3	2	2	Sample 86	1	2	4	4
Sample 40	0	7	5	3	Sample 87	1	11	3	1
Sample 41	0	2	0	1	Sample 88	3	3	5	2
Sample 42	1	7	2	4	Sample 89	2	3	1	0
Sample 43	1	3	0	0	Sample 90	2	4	5	3
Sample 44	0	10	0	1	Sample 91	1	4	0	0
Sample 45	0	1	0	0	Sample 92	4	8	6	5
Sample 46	1	4	2	1	Sample 93	0	1	0	3
Sample 47	2	6	5	4	Sample 94	0	3	0	3

Appendix F.4 Identification of LREs in collaborative dialogue assessed by assessor 2

	F-LREs	L-LREs	M-LREs	D-LREs		F-LREs	L-LREs	M-LREs	D-LREs
Sample 1	0	4	1	4	Sample 48	2	6	2	7
Sample 2	1	4	0	4	Sample 49	0	9	1	3
Sample 3	2	4	1	1	Sample 50	1	9	0	4
Sample 4	0	3	2	2	Sample 51	3	10	2	7
Sample 5	0	2	0	0	Sample 52	1	10	1	2
Sample 6	3	7	3	4	Sample 53	0	3	1	0
Sample 7	4	5	3	2	Sample 54	1	3	2	0
Sample 8	4	10	7	7	Sample 55	1	7	1	6
Sample 9	0	4	3	1	Sample 56	1	0	1	0
Sample 10	0	2	1	0	Sample 57	1	4	2	0
Sample 11	1	13	8	4	Sample 58	1	7	1	1
Sample 12	0	0	0	1	Sample 59	1	8	0	2
Sample 13	2	9	0	0	Sample 60	2	3	0	1
Sample 14	1	7	3	1	Sample 61	1	10	2	3
Sample 15	1	6	2	6	Sample 62	0	15	1	1
Sample 16	0	7	0	0	Sample 63	1	6	0	2
Sample 17	0	9	0	6	Sample 64	1	4	1	0
Sample 18	2	8	0	2	Sample 65	1	6	5	2
Sample 19	1	4	0	0	Sample 66	1	11	2	2
Sample 20	0	12	0	0	Sample 67	0	3	2	2
Sample 21	1	5	2	0	Sample 68	0	0	1	0
Sample 22	2	6	4	4	Sample 69	0	6	1	1
Sample 23	1	5	4	4	Sample 70	2	8	3	5
Sample 24	3	2	1	3	Sample 71	0	4	2	0
Sample 25	1	4	2	2	Sample 72	0	1	1	0
Sample 26	0	2	3	0	Sample 73	0	6	2	3
Sample 27	2	4	1	1	Sample 74	1	6	4	2
Sample 28	0	6	2	2	Sample 75	0	2	0	0
Sample 29	0	1	0	0	Sample 76	0	4	0	1
Sample 30	1	6	2	1	Sample 77	2	9	2	1
Sample 31	1	4	0	3	Sample 78	0	4	1	1
Sample 32	1	9	10	0	Sample 79	0	4	1	2
Sample 33	0	2	0	0	Sample 80	2	4	0	1
Sample 34	2	5	0	1	Sample 81	2	10	4	6
Sample 35	0	3	0	3	Sample 82	0	7	3	1
Sample 36	1	7	0	1	Sample 83	3	5	1	2
Sample 37	0	1	1	2	Sample 84	2	8	0	3
Sample 38	0	2	0	2	Sample 85	0	6	0	4
Sample 39	2	3	2	2	Sample 86	1	2	4	4
Sample 40	0	7	5	5	Sample 87	1	11	3	1
Sample 41	0	2	0	1	Sample 88	3	3	5	2
Sample 42	1	7	2	4	Sample 89	2	3	1	0
Sample 43	1	3	0	0	Sample 90	2	4	4	2
Sample 44	0	10	0	1	Sample 91	1	4	0	0
Sample 45	0	1	0	0	Sample 92	4	8	6	5
Sample 46	1	4	2	1	Sample 93	0	1	0	2
Sample 47	2	6	5	4	Sample 94	0	3	0	3

Key: Different rating to first assessor

Appendix F.5 Score differences between rater 1 and rater 2 and final score resolution

First Marker	F-LREs	L-LREs	M-LREs	D-LREs	Second Marker	F-LREs	L-LREs	M-LREs	D-LREs
Sample 5	0	1	0	0	Sample 5	0	2	0	0
Sample 6	3	6	3	5	Sample 6	3	7	3	4
Sample 15	2	6	2	5	Sample 15	1	6	2	6
Sample 17	0	8	0	6	Sample 17	0	9	0	6
Sample 20	0	12	1	0	Sample 20	0	12	0	0
Sample 36	2	6	0	1	Sample 36	1	7	0	1
Sample 38	0	4	0	1	Sample 38	0	2	0	2
Sample 40	0	7	5	3	Sample 40	0	7	5	5
Sample 62	0	14	1	1	Sample 62	0	15	1	1
Sample 68	0	0	0	0	Sample 68	0	0	1	0
Sample 73	0	6	2	2	Sample 73	0	6	2	3
Sample 75	0	1	0	0	Sample 75	0	2	0	0
Sample 81	2	10	3	9	Sample 81	2	10	4	6
Sample 90	2	4	5	3	Sample 90	2	4	4	2
Sample 93	0	1	0	3	Sample 93	0	1	0	2

Final score resolution

	F-LREs	L-LREs	M-LREs	D-LREs
Sample 5	0	1	0	0
Sample 6	3	7	3	4
Sample 15	2	6	2	5
Sample 17	0	9	0	6
Sample 20	0	12	1	0
Sample 36	2	6	0	1
Sample 38	0	4	0	1
Sample 40	0	7	5	3
Sample 62	0	14	1	1
Sample 68	0	0	1	0
Sample 73	0	6	2	2
Sample 75	0	1	0	0
Sample 81	2	10	3	9
Sample 90	2	4	4	2
Sample 93	0	1	0	2

Appendix F.6 Score differences the first assessment and reassessment of 10% of samples randomly selected

1st Assessment	F-LREs	L-LREs	M-LREs	D-LREs	Reassessment	F-LREs	L-LREs	M-LREs	D-LREs
Sample 1	0	4	1	4	Sample 1	0	4	1	4
Sample 5	0	1	0	0	Sample 5	0	1	0	0
Sample 11	1	13	8	4	Sample 11	1	13	8	4
Sample 12	0	0	0	1	Sample 12	0	0	0	1
Sample 19	1	4	0	0	Sample 19	1	4	0	0
Sample 26	0	2	3	0	Sample 26	0	2	3	0
Sample 31	1	4	0	3	Sample 31	1	4	0	3
Sample 56	1	0	1	0	Sample 56	1	0	1	0
Sample 72	0	1	1	0	Sample 72	0	1	1	0
Sample 75	0	1	0	0	Sample 75	0	1	0	0

Key

F-LREs = Form-focused language related episode
L-LREs = Lexical language related episode
M-LREs = Mechanical language related episode (spelling and punctuation)
D-LREs = Discourse language related episode (cohesion and organization)

Difference between scores

Agreement= 10/10* 100 = 100%

Appendix F.7 Final assessment of LREs in collaborative writing dialogue agreed upon by both assessors

	F-LREs	L-LREs	M-LREs	D-LREs		F-LREs	L-LREs	M-LREs	D-LREs
Sample 1	0	4	1	4	Sample 48	2	6	2	7
Sample 2	1	4	0	4	Sample 49	0	9	1	3
Sample 3	2	4	1	1	Sample 50	1	9	0	4
Sample 4	0	3	2	2	Sample 51	3	10	2	7
Sample 5	0	1	0	0	Sample 52	1	10	1	2
Sample 6	3	7	3	4	Sample 53	0	3	1	0
Sample 7	4	5	3	2	Sample 54	1	3	2	0
Sample 8	4	10	7	7	Sample 55	1	7	1	6
Sample 9	0	4	3	1	Sample 56	1	0	1	0
Sample 10	0	2	1	0	Sample 57	1	4	2	0
Sample 11	1	13	8	4	Sample 58	1	7	1	1
Sample 12	0	0	0	1	Sample 59	1	8	0	2
Sample 13	2	9	0	0	Sample 60	2	3	0	1
Sample 14	1	7	3	1	Sample 61	1	10	2	3
Sample 15	2	6	2	5	Sample 62	0	14	1	1
Sample 16	0	7	0	0	Sample 63	1	6	0	2
Sample 17	0	9	0	6	Sample 64	1	4	1	0
Sample 18	2	8	0	2	Sample 65	1	6	5	2
Sample 19	1	4	0	0	Sample 66	1	11	2	2
Sample 20	0	12	1	0	Sample 67	0	3	2	2
Sample 21	1	5	2	0	Sample 68	0	0	1	0
Sample 22	2	6	4	4	Sample 69	0	6	1	1
Sample 23	1	5	4	4	Sample 70	2	8	3	5
Sample 24	3	2	1	3	Sample 71	0	4	2	0
Sample 25	1	4	2	2	Sample 72	0	1	1	0
Sample 26	0	2	3	0	Sample 73	0	6	2	2
Sample 27	2	4	1	1	Sample 74	1	6	4	2
Sample 28	0	6	2	2	Sample 75	0	1	0	0
Sample 29	0	1	0	0	Sample 76	0	4	0	1
Sample 30	1	6	2	1	Sample 77	2	9	2	1
Sample 31	1	4	0	3	Sample 78	0	4	1	1
Sample 32	1	9	10	0	Sample 79	0	4	1	2
Sample 33	0	2	0	0	Sample 80	2	4	0	1
Sample 34	2	5	0	1	Sample 81	2	10	3	9
Sample 35	0	3	0	3	Sample 82	0	7	3	1
Sample 36	2	6	0	1	Sample 83	3	5	1	2
Sample 37	0	1	1	2	Sample 84	2	8	0	3
Sample 38	0	4	0	1	Sample 85	0	6	0	4
Sample 39	2	3	2	2	Sample 86	1	2	4	4
Sample 40	0	7	5	3	Sample 87	1	11	3	1
Sample 41	0	2	0	1	Sample 88	3	3	5	2
Sample 42	1	7	2	4	Sample 89	2	3	1	0
Sample 43	1	3	0	0	Sample 90	2	4	4	2
Sample 44	0	10	0	1	Sample 91	1	4	0	0
Sample 45	0	1	0	0	Sample 92	4	8	6	5
Sample 46	1	4	2	1	Sample 93	0	1	0	2
Sample 47	2	6	5	4	Sample 94	0	3	0	3

Key: Score differences resolved and final score agreed upon

Appendix G.1 – Example of a transcribed collaborative dialogue (complete) with highlighted LREs

Speakers

student 1 = S1

student 2 = S2

Instructor = I

Script key

[time]

Italic script = translated Arabic dialog

I [1:54] Ladies, when you are ready... when you have a clear idea… don't make the summary too long, right?... Just the main ideas… and that it's it. go head… ladies, I have put an example on the bored if you want to have a quick look.

S1 [3:29] *Finished?*

S2 [3:03] ***yes.***

S1 [3:42] *so… what is the first thing you going to write?*

S2 [3:45] ***the* main idea**

S1 [3:46] *see… first… I think… first of all… the* title… sir, do we need to write the title for it?... do we need…

I [3:58] No…no

S1 [4:02] okay…

S2 [4:03] ***the* main idea… *first we have to write the* summary… *what's the* main idea?**

S1 [4:10] *we could write for instance*… many years ago… food was much simpler then it is right now or these days or much healthier.

S2 [4:30] ***yeah… okay***

S1 [4:39] *because… okay write down…*many years ago food was simple yet healthy in the same time.

I [4:55] another 30 minutes should do it.

S2 [5:06] food was healthy and simple?

S1[5:09] what?

S2 [5:10] food was heathy <u>yet</u> simple?

S1 [5:12] simple yet healthy… because of the meaning...

I [5:18] eventually you are going to write it on one of these, right ladies?

S1[5:19] yes

I [5:20] you are planning it, right?

S1 [5:21] yeah… simple **<u>yet</u>** healthy in the same time … mmm… such as… fish and rice or camel milk and dates… mmm… okay... camel milk and date... okay... now this

I [6:06] When you are done your summary, ladies, remember you need to decide the food.

S2 [6:10] *that*… they used to get… *that*… *that*… fruits

S1 [6:16] *okay who are you going to start straight away with* fruits?... you need to link this with the last sentence,

S2 [6:21] oh. Okay

S1 [6:26] *say for example*… another thing we had was fruits…*but it was only for the ill ones*… fruits.

I [7:23] write it here…. and write your name too...

S1 [7:27] but for the description for this one … do we have to write it after the summary…

I [7:34] yes… so summary first… and then decide on the food and write you respond on food.

S1[7:38] oh…okay

I [7:39] the problem is you need to decide what food cause you going to do the same one.

S1 [7:41] Okay… *okay*… another thing we have with food… mmm…. For example, we say… it was..

S2 [7:59] ***they mentioned that some of it was brought from Ra's al-Khaimah and other* was imported from Iran… *meaning, where did they brought* fruits?**

S1 [8:07] *yes but ... he said... that they were for* recovery from illness

S2 [8:13] ***yes but … you mean we write those two?... we only should mention the important points not everything.***

S1 [8:23] *yes so, we say…* mmm… it was *... for example*... it was hard to get and expensive in our childhood.

S2 [8:40] **yes… it was hard to get and was reserved for the…**

S1 [8:45] that's why it was reserved for…

S2 [8:49] **for people...**

S1 [8:52] for people to recover from illness.

S2 [8:55] **okay… it was hard to get…**

S1 [9:00] and import.

S2 [9:01] **was hard to get... *should we write*… some were imported and some were hard to get from Ra's al-Khaimah… *or do you think no need for this* detail.**

S1 [9:12] *I don't know… actually we should write* … it was hard to get … one second… yes… it was hard to get from Ra's al-Khaimah… and expensive to import from Iran.

S2 [10:10] **expensive because… it was… *what's written here*?**

S1 [10:14] from Iran… therefore it was reserved for ill people to recover or for celebrations

S2 [10:23] ***or* for special occasions**

I [10:25] once you finish your summary, remember, you need to decide what food you are going to describe

S1 [10:33] *okay and then we move along to* hunting…mmm… we had the skills of hunting… to double our food

S2 [11:04] **to <u>double</u> our food?**

S1[11:08] *I mean to increase from… I mean they did have much food.*

S2 [11:10] **yes.**

S1[11:17] *what did you write?*

S2 [11:18] **to double our (mumble) food … *or just* to double our food… *to indicate that they did have much to eat.***

S1 [11:27] *yes*… Okay

S2 [11:38] **like hunting for houbara, karawan and dhabi.**

S1 [12:10] okay... and then

I [12:11] this just your summary?

S1 [12:12] yeah…

I [12:13] good…good

S2 [12:16] ***we didn't finish the summary.***

S1[12:17] *we will finish it now… last* sentence

S2 [12:19] **okay… *now*?**

S1 [12:22] *now…we* will sum up *everything*.

S2 [12:27] ***we didn't mention this part.***

S1 [12:29] *we don't need to mention everything, don't you think?*

S2 [12:34] ***yeah… but we left out a lot of thing***

S1 [12:40] *he thinks this is our* summary

S2 [12:43] ***the paper has a lot of writing space so let's add more***

S1 [12:46] okay…

S2 [12:53] **jerard was another thing**

S1 [12:56] furthermore, an insect called jerard used to be…

S2 [13:09] **our…part of our snack**

S1 [13:10] *yes…*snacks

S2 [13:16] **however these days people… where was it?... people find it disgusting idea… *enough?... should we*** *add more?*

S1 [13:42] *should we mention this part?*

S2 [13:43] ***what?***

S1 [13:44] *we mention this part… here*

S2 [13:46] **ha?**

S1 [13:48] *this right here*

S2 [13:49] ***yes will keep this for the end since we were talking about jerard.***

S1 [13:56] okay

S2 [14:05] **in our childhood we didn't care obesity but now it one of the… one of the important issues in our con-… in our world.**

I [14:17] In your response... leave a space… between your… between your summary and your response, ladies… if you haven't done. don't worry… but try to leave some space.

S1 [14:44] *enough?*

S2 [14: 51] Mmm… that's why … Mmmm… fat people considered as rich… what do you think?

S1 [15:05] (mumbles)… *should we write?*

S2 [15:08] *I think it's enough*

S1 [15:10] *this will be…*

S2 [15:10] *yes okay..*

S1 [15:12] *because is will…*

S2 [15:15] *should we write it now… or later together?*

I [15:18] when you finish you will write that there, right?

S1 [15:20] yeah

I [15:22] yeah… good… oh.. you are planning it… very good.

S2 [15:33] *So… now…*

S1 [15:35] *what's our*…the …

S2 [15:38] food item.

S1 [15:43] *what about* dates*?... because it's what Emirates is known for.*

S2[14:49] *we should choose from here* … from the text?

S1 [15:52] *they mentioned that we should chose something popular not necessarily* text

S2 [15:57] okay… *yeah but* dates *is* popular *but what?... what?... I don't know… I mean what are we going to write about it?*

S1 [16:08] true…

I [16:13] Ladies the food doesn't matter it's popular … doesn't have to be from here … it can be from anywhere you want… it could be a hot dog or a … i don't know… soup... as long as it's popular … salad… bryani

S2[16:29] **lets write about harees**

S1[16:30] *what is* harees?... *what is it* considered?... *as a meal?*

S2 [16:36] ***yes… and they prepare it on special occasions… and all the time… for kids, adults and everyone to eat***

S1 [16:48] *Okay…*

S2 [16:49] **Okay… Mmm…**

S1 [16:55] harees… *now we go ahead and* define it…

S2 [16:57] **okay… hrees is a type of food that is… is white and …. *What can we say about it?***

S1 [17:26] *it's soft*

S2 [17:27] ***yes***

S1 [17:28] *how can we write it?... it's* smooth?... no

S2 [27:31] ***can we use* smooth *to describe food?***

S1 [17:33] *no*

S2 [17:45] ***what did you write?***

S1 [17:46] harees is a type of emirates traditional food that is … *now we should describe it* …

S2 [18:00] **there is… there is eatable for all ages…**

I [18:15] 15 minutes

S2 [18:18] ***look… see how he is looking at us… it is a good mean for all ages…***

S1 [18:26] *yes*

S2 [18:28] **okay… *we finished the* main idea… supporting idea…**

S1 [18:35] *now we should write… the hrees is ate easily* by children, people *and everyone.*

S2 [18:43] ***how do we start?***

S1 [18:45] harees is emirates traditional… *should we write* Emirati *or* emirates?

S2 [18:50] **Emirati…**

S1 [18:53] Emirati traditional food… that is

S2 [18:56] **that is eatable by all ages… *we wrote* eatable by all ages *before… so we need to change it… we will write…* it's soft… It's soft like baby's food… because there is resemblance…no… write and…**

I [19:30] this is your notes… or you are writing here?

S2 [19:34] **no…notes**

I [19:44] you are writing it here… you are writing it here and then rewriting it here

S1 [19:38] yeah

S2 [19:40] **mmm… and…. *What was I saying?*... it is soft like baby's food… and it is eaten with… *what's oil in English?***

S1 [20:05] oil?

S2 [20:09] ***write down… using oil… then…* homemade oil… *then…* supporting idea…**

S1 [20:31] supporting idea two… *the* example

S2 [20:36] ***we can say…***

S1 [20:39] *yeah… it looks* related

S2 [20:41] **describe… *so it should be a* description, *we can't give an* example...**

S1 [20:47] yeah, yeah …

S2 [20:52] ***okay….* Mmmm… it is… presented… *how can I say served?***

S1 [20:59] it is prepared

S2 [21:03] **it is reserved… it is reserved…**

S1 [21:10] in large *plate*

S2 [21:14] ***what?***

S1 [21:16] *I mean it is served in large plates… or is it not necessary?*

S2 [21:18] ***no.. yeah… write it down…*** **in large balls**

S1 [21:27] is it necessary to write that down?

S2 [21:28] **or just write down… it is reserved in special occasion, like 'Eid… parties…** ***and add…*** **everybody like it's taste… because…**

S1 [22:11] *we can't write that down because not everybody likes its taste*

S2 [22:19] **most people like it's taste because it's easy to eat… to eat… to be eaten… and easy to make…** ***no...*** **easy to make and easy to be eaten…**

S1 [22:40] *let's add on what it is made of….*

S2 [22:50] **it is made of harees beans with rice… rice… and chicken or meat…**

S1[23:10] *only* chicken or meat… *or* chicken or meat *flavor*?

S2 [23:17] ***what?***

S1 [23:18] chicken or meat *only?*

S2 [23:19] ***yeah***

S1 [23:23] *did you write down…* easy to make?

S2 [23:26] **yeah**

S1 [23:29] it is tasty and easy to be eaten. Furthermore, it is made of harees beans, rice and chicken or meat.

S2 [23:42] **it was very popular in our childhood.**

S1 [24:00] harees was very popular in our childhood.

S2 [24:20] **okay… read it and I'll write it**

S1 [24:22] okay… many years ago…. Food was simple... yet healthy in the same time such as fish, rice, camel milk and date. Another thing we had.. *not* another thing… another thing was fruits

S2 [25:30] no not was… grammar

S1 [25:40] *we studied in school that was for….*

S2 [25:48] *for the plural*

S1 [25:49] *yes for the plural be we don't always used it*

S2 [25:52] *okay no problem we will write…*

S1 [25:48] okay… it was hard to get…. Full stop… some were from RAK… and some are imported from Iran

S2 [26:29] some of them

S1 [26:30] okay… therefore it was expensive.

S2 [26:52] the… *what*?

S1 [26:53] there**fore**… *they write it like this*…F O R E comma it was expensive and reserved… no… reserved?... I don't want to repeat…

S2 [27:21] reserved… and kept

S1 [27:22] and was kept… for ill people to recover or for special occasions… full stop… moreover

S2 [28:00] *should I flip the page or continue here*

S1 [28:04] *no continue here*… comma some people had the skills of hunting… houbara, karawan …. And…

S2 [28:48] okay?

S1 [28:49] to double our food… furthermore, and insect called jarad used to be a part of our snack… full stop… however people nowadays… *should we skip this part... I think it's too long...*

S2 [29:40] ***what?***

S1 [29:41] however people now a days find it disgusting *or no need?.... it's okay...*however people nowadays, find it disgusting… *enough... okay... fine*… obesity wasn't

S2 [30:20] ***how so we write*** **obesity?**

S1 [30:23] obesity… wasn't a worry *or* wasn't a problem?

S2 [30:31] ***what?***

S1 [30:33] wasn't a worry *or* wasn't a problem?

S2 [30:42] **problem?**

S1 [30:45] wasn't a problem due to the scares of food

S2 [30:49] **what ?**

S1 [30:58] scares of food… like this… of… enough full stop… now the response… harees is a type of emirati… traditional food... r a t i… traditional food... that is eatable by all ages… all ages… okay… full stop… no it is… n*o should we write* it is *or* the texture of it is soft like baby's food?

S2 [32:19] ***I don't know... anything***

S1 [32:20] okay it is soft like baby's food…okay*... I think this not* connected… soft like baby's food *and* eaten with *oil ...* eaten by oil *should be with made of…I don't know*

S2 [32:40] ***yeah okay… then full stop***

S1 [32:50] yeah... full stop… also it is prepared… for special occasions like eid, weddings…and celebrations… full stop… hrees is tasty and easily to be eaten full stop... furthermore, it is made of hrees beans, rice.

S2 [34:20] **how do we write beans?**

S1 [34:23] b e a n s… comma rice comma and chicken and meat …. It is eaten with oil in bracket homemade oil … full stop… harees used to be a popular food and still nowadays… and still… draw an arrow… and still nowadays

S2 [35:30] **no need it's the same… finished?**

S1 [35:40] finished… I think we should reduce from this because he said this should be less than this.

S2 [35:45] **we should add more but I think we don't have enough time**

S1 [35:49] yes true…. Oh, we did write the authors name… in brackets… here brackets… write Al-habtoor comma 2012.

LRE	Exchanges		
Form-focused LREs (F-LRE)	1		
Lexical LREs (L-LRE)	8	Identified by 1st assessor	
Mechanical LREs (M-LRE)	3	Spelling = 2	Punctuation = 1
Discourse LREs (D-LRE)	4	Organization = 3	Cohesion = 1
Total LREs	16		

Appendix H.1 Guide to identification of LREs in collaborative writing dialogue.

A form-focused LRE (F-LRE) is a language related episode where both students discuss the use of grammar. This may include asking and answering questions, providing peer feedback, or deliberating about appropriate use of grammar.

A lexical LRE (L-LRE) is a language related episode where both students discuss the use of lexis. This may include asking and answering questions, providing peer feedback, or deliberating about appropriate use of vocabulary.

A mechanical LRE (M-LRE) is a language related episode where both students discuss the use of spelling or punctuation in writing. This may include asking and answering questions and providing peer feedback about spelling or punctuation.

A discourse LRE (L-LRE) is a language related episode where both students discuss textual cohesion and organization of written text. This may include asking and answering questions, providing peer feedback, or deliberating about how ideas can be linked together and organized according to the rhetorical conventions of the text.

Note. A language related episodes must involve the participation of both learners and not simply an unanswered question or comment made by one student.

Appendix I.1 Student data included or not included in this study

Collaborative writing groups

Group 1		Group 4		Group 6		Group 8	
C1-1	included	C2-1	included	C3-1	included	C4-1	Not enrrolled
C1-2	No permission	C2-2	included	C3-2	included	C4-2	included
C1-3	Pre/post NC	C2-3	included	C3-3	included	C4-3	Pre/post NC
C1-4	included	C2-4	Pre/post NC	C3-4	Not enrrolled	C4-4	Pre/post NC
C1-5	included	C2-5	included	C3-5	included	C4-5	included
C1-6	included	C2-6	Pre/post NC	C3-6	included	C4-6	included
C1-7	included	C2-7	included	C3-7	Dropped	C4-7	No permission
C1-8	Dropped	C2-8	included	C3-8	included	C4-8	included
C1-9	Dropped	C2-9	Pre/post NC	C3-9	included	C4-9	included
C1-10	Pre/post NC	C2-10	included	C3-10	included	C4-10	included
C1-11	included	C2-11	included	C3-11	included	C4-11	included
C1-12	included	C2-12	included	C3-12	included	C4-12	Dropped
C1-13	included	C2-13	No permission	C3-13	No permission	C4-14	included
C1-14	included	C2-14	included	C3-14	included	C4-13	Not enrrolled
C1-15	included	C2-15	included	C3-15	No permission	C4-15	included
C1-16	included	C2-16	included	C3-16	included	C4-16	Illegible script
C1-17	included	C2-17	Not enrrolled	C3-17	Pre/post NC	C4-17	included
C1-18	included	C2-18	Dropped	C3-18	included	C4-18	included
C1-19	included	C2-19	included	C3-19	Pre/post NC	C4-19	included
C1-20	included	C2-20	No permission	C3-20	included	C4-20	included
C1-21	Pre/post NC	C2-22	included	C3-21	Dropped	C4-21	Not enrrolled
C1-22	included	C2-21	Not enrrolled	C3-22	included	C4-22	included
		C2-23	included	C3-23	Pre/post NC	C4-23	included
		C2-24	included	C3-24	included	C4-24	included

Independent writing groups

Group 2		Group 3		Group 5		Group 7	
I1-1	included	I2-1	included	I3-1	Illegible script	I4-1	Pre/post NC
I1-2	included	I2-2	included	I3-2	included	I4-2	included
I1-3	included	I2-3	included	I3-3	included	I4-4	included
I1-4	included	I2-4	included	I3-4	included	I4-3	No permission
I1-5	Not enrrolled	I2-5	Dropped	I3-5	included	I4-5	included
I1-6	included	I2-6	Pre/post NC	I3-6	Dropped	I4-6	included
I1-7	included	I2-7	included	I3-7	included	I4-7	included
I1-8	included	I2-8	included	I3-8	included	I4-8	included
I1-9	included	I2-9	included	I3-9	included	I4-9	included
I1-10	included	I2-10	included	I3-10	No permission	I4-10	included
I1-11	included	I2-11	included	I3-11	Dropped	I4-11	included
I1-12	included	I2-12	included	I3-12	included	I4-12	included
I1-13	included	I2-13	included	I3-14	included	I4-14	included
I1-14	Pre/post NC	I2-14	included	I3-13	Pre/post NC	I4-13	Pre/post NC
I1-15	included	I2-15	No permission	I3-15	included	I4-15	included
I1-16	included	I2-16	Pre/post NC	I3-16	Pre/post NC	I4-16	included
I1-17	Dropped	I2-17	included	I3-17	No permission	I4-17	included
I1-18	included	I2-18	included	I3-18	included	I4-18	included
I1-19	Pre/post NC	I2-19	included	I3-19	included	I4-19	included
I1-20	included	I2-20	included	I3-20	included	I4-20	Not enrrolled
I1-21	included	I2-21	included	I3-21	Not enrrolled		
I1-22	included	I2-22	Not enrrolled	I3-22	Not enrrolled		

	Collaborative groups	Independent groups
Registered but **not enrolled**	6	5
Dropped	6	4
Pre/post test writing not completed (NC)	11	8
No permission (consent not given)	6	4
Illegible script	1	1