Cohesion, Coherence, and Children Narrative Writing Quality: Topical Structure Analysis

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Abstract
Studies have been conducted to examine the usage of cohesive devices and writing quality. Studies report that appropriate usage of cohesive ties is positively related to writing quality. Few studies, however, have examined the relationship between cohesion, coherence, and quality of English-as-a-second-language children's writing by comparing high- and low-proficiency groups with the use of analytic software and holistic assessment by human raters. Hence, it is important to investigate this underrepresented area because different language proficiency levels may impact the usage of cohesive devices and writing quality. In the current study, 19 Grade 4 participants (aged 9–10 years old) were given an original story, "Ruby's Sunflower," which was adopted from the national curriculum. They read the story and then wrote a new story with a different ending. Approximately 45 minutes were given for the participants to write a composition. Pretest, intermediate test, and posttest were used for data analysis. Results show that the lower proficiency group tended to overuse *and*, *so*, and *then*. Students in the lower proficiency group may not have enough knowledge of lexical collocation compared to the higher proficiency group. Through explicit teaching of cohesive devices, cohesion and coherence can be improved by using appropriate cohesive devices to connect the sentences and ideas.

Keywords: cohesion, coherence, writing quality

A number of studies have been conducted to investigate the usage of cohesive devices and writing quality (Dossoumon et al., 2018). Studies report that appropriate usage of cohesive ties is positively related to writing quality (Cameron et al., 1995), whereas other research studies report insignificant results (Spiegel & Fitzgerald, 1990). In English-as-a-second-language / English-as-a-foreign language contexts, the relations between cohesion and writing quality have been investigated. The participants in English as a second language contexts were mainly university students (Crossley et al., 2016; Yang & Sun, 2012). Some research studies were criticized due to invalid methodology (Yang & Sun, 2012; Zhang, 2000). Few studies, however, have examined the relationship between cohesion, coherence, and quality

of L2 children's writing by comparing high- and low-proficiency groups with the use of analytic software and holistic assessment by human raters. Hence, it is important to investigate this underrepresented area because different language proficiency levels may impact the usage of cohesive devices and writing quality.

This study addresses these gaps by analyzing 11 subcategories of writing quality (adapted from Wagner et al., 2011), namely, (1) topic, (2) logical ordering of ideas, (3) number of key story elements, (4) mean length of T-unit (MLT), (5) clause density, (6) total number of words, (7) number of different words (NDW), (8) number of spelling errors, (9) number of capitalization errors, (10) number of errors involving period, and (11) number of tense errors, using the L2 Syntactic Complexity Analyzer (L2SCA; Yang et al., 2015), the Lexical Complexity Analyzer (LCA; Lu, 2012), the Systemic Analysis of Language Transcripts (SALT) conventions (Miller & Iglesias, 2015), and two raters' holistic scoring. An approach using analytic software and holistic assessment by two raters helps to understand the children's quality of writing. This study also adopts topical structure analysis (TSA; Lautamatti, 1987) to measure the coherence of L2 children's texts. The number of cohesive devices may not be a sole indicator for judging a coherent text; a text that is full of cohesive ties might not be globally coherent (Ahmad et al., 2019). Past research studies have shown that coherence and writing quality have been measured holistically (Crossley et al., 2016; Fitzgerald & Spiegel, 1986; Yang & Sun; 2012). However, the problem of holistic measurement is that raters may be biased (Crossley & McNamara, 2014). To avoid the shortcomings of holistic measurement of coherence, TSA is used to analyze the topical development of discourse. Topical progression contributes to the development of the discourse topic of texts (Lautamatti, 1987). In this study, cohesion is about using linguistic cues for readers to connect generated ideas in the text (Crossley et al., 2016). Coherence refers to "overall discourse-level property of unity" (Fitzgerald & Spiegel, 1986, p. 263).

This study contributes to English language writing instruction in L2 settings. Despite the importance of maintaining coherence throughout the texts, the link between cohesion and coherence and writing quality is underinvestigated in L2 writing research. For instance, only two papers published by the *Journal of*

Second Language Writing from 2011 to 2016 focused on cohesion or coherence. Since we know very little about the topic on human and nonhuman scoring of cohesion and coherence of children's writing, the use of analytical tools (such as L2SCA, LCA, SALT conventions) and scoring by human raters may afford us to investigate cohesion and coherence of the L2 children's narrative writing in greater depth.

Literature Review

Cohesion, Coherence and L1 writing

A number of studies have examined the relationship among cohesion, coherence, and writing quality in L1 children's writing (Fitzgerald & Spiegel, 1986). Researchers measure cohesion by computing (1) cohesive devices by following the categorizations (i.e., reference, ellipsis, substitution, lexical cohesion, and conjunction) suggested by Halliday and Hasan (1976; Bae, 2001; Cameron et al., 1995; Fitzgerald & Spiegel, 1986; McCulley, 1985; Spiegel & Fitzgerald, 1990), (2) cohesive density (Hedberg & Fink, 1996), (3) cohesive harmony (Hasan, 1984; Hedberg & Fink, 1996; Spiegel & Fitzgerald, 1990), and (4) cohesive errors (Fitzgerald & Spiegel, 1986). For example, Fitzgerald and Spiegel (1986) examined Grade 3 and Grade 6 narrative writing. Results showed that greater coherence emerged when using cohesive ties selectively and at shorter distance. Cohesion and writing quality were positively related. On the other hand, McCulley (1985) pointed out that holistically measured coherence scores were positively correlated to writing quality. Bae (2001) argued that the usage of reference and lexical cohesive devices was positively correlated to the writing quality. The correlation of cohesion, coherence, and quality of writing among L1 children's writing is dependent on the topic (Fitzgerald & Spiegel, 1986; Spiegel & Fitzgerald, 1990), grade level, and genre.

Cohesion, Coherence, and L2 writing

The analysis of cohesion and coherence in L2 writing is examined by using automated software to measure cohesion using Coh-Metrix (Crossley & McNamara, 2014; Guo et al., 2013; McNamara et al., 2015) and TAACO (Crossley et al., 2016). Coh-Metrix and TACCO have over 30 indices to measure local, global, and text level of cohesion automatically. The most recent study from Crossley

et al. (2016) showed that four indices among 30 cohesive indices were positively correlated to human rated writing quality. However, these four indices did not demonstrate the growth patterns in a longitudinal way (p. 13). Crossley and McNamara (2012) and Guo et al. (2013) found that the local and text cohesive devices were negatively correlated with human rated writing quality in Hong Kong high school students' Advanced Level Examination and Test of English as a Foreign Language. The results need to be carefully interpreted. First, the results include both appropriate and inappropriate usage of cohesive devices. This means children's texts containing cohesive errors are probably not detected by the automated software. Second, the usage of cohesion devices may not imply how coherent a text is written. Although Coh-Metrix and TACCO are designed to analyze the global and text level of cohesion, coherence is formed by linguistic features and readers' expectation and prior knowledge.

Besides using automated software, Yang and Sun (2012) analyzed the relationship between usage of cohesive devices and writing quality by examining two different proficiency groups of Chinese undergraduates' EFL argumentative writing. The results showed that the groups were significantly different in the usage of reference and lexical as well as incorrect usage of cohesive devices. Furthermore, they found that overall correct usage of cohesive devices was positively correlated to writing quality regardless of language proficiency. However, some research studies about cohesion and coherence in ESL/EFL writing have "methodological flaws or restricted foci" (Yang & Sun, 2012, p. 32). For instance, some research studies applied invalid methods to measure some cohesive devices by analyzing frequency and means without considering the number of written words (Zhang, 2000).

Chiang's (1999) study showed a strong relationship between cohesion and overall writing quality. However, the study used a holistic five-point scale, which may not fully capture coherence, cohesion, and writing quality. Todd et al. (2007) measured the coherence using TSA, genre analysis, and cohesion through lexical analysis. The results showed that cohesion and writing quality had a significant correlation. However, coherence was not significantly correlated to the quality of writing. The insignificant results might be due to the small sample size ($N = 8$) and limited analysis focusing only on lexical cohesion.

TSA has been used to assess the academic writing quality, particularly in a few studies in ESL/EFL settings. For instance, according to Schneider and Connor (1990), the highest Test of Written English scorers showed more sequential progression, which is defined as "the predicate, or the rhematic part of one sentence, provides the topic for the next" (Lautamatti, 1987, p. 88), and less parallel progression, which is "the same sub-topic in a number of successive sentences" (p. 88), in their proportion of topical progression compared with low scorers. In contrast, Flores and Yin (2015) found that the college freshmen in the Philippines did not differ in sequential and parallel progression among the low and high scorers.

To the best of our knowledge, previous studies on coherence, cohesion, and writing quality mainly examined ESL/EFL students in the tertiary setting. Research studies focusing on cohesion and coherence of L2 writing among young learners have not fully explored. This study addresses the following questions:

1. What is the Grade 4 students' usage of cohesive devices in narrative writing?
2. Is there a significant difference between the high-proficiency group and low-proficiency group in terms of topical structure progression in narrative writing?
3. Does the usage of cohesive devices correlate to writing quality?
4. Does the coherence of texts correlate to writing quality?

Methodology

This study was a part of the larger study that investigated the impact of a sociocognitive writing program on Grade 4 student writing in an elementary school in Singapore. English, Malay, Chinese, and Tamil are official languages in Singapore (Zhang et al., 2022). Nineteen students participated in this study. The intervention program consisted of four lessons from February to May 2016. Before the commencement of the intervention program, the principal investigator conducted a two-hour training session to six teachers to inform the purpose and practice of the sociocognitive approach to the writing program. Lesson plans and teaching materials were given to the English language teachers who executed the intervention program. The participants included high- and low-proficiency

students. The pretests were scored using a rubric adapted from Wagner et al. (2011). The scores ranged from 106 to 465. A total score above 260 was categorized as high proficiency (N = 11), and a score below 260 as low proficiency (N = 8).

The Grade 4 participants (aged 9–10 years old) were given an original story, "Ruby's Sunflower," which was adopted from the national curriculum. They read the story and then wrote a new story with a different ending. Approximately 45 minutes were given for the participants to write a composition. Pretest, intermediate test, and posttest were used for data analysis. The data were collected over two years, from January 2016 until December 2017, at a local primary school.

To analyze cohesive devices and TSA, Halliday and Hasan (1976) developed a set of criteria for maintaining cohesion. They identified reference, substitution, ellipsis, conjunction, and lexical cohesion to show discoursal cohesion. The system was modified by Halliday (2004, p. 317) to merge ellipsis and substitution, which often coexist simultaneously, such as "*I preferred the other [one]*" (p. 317). Categories, subcategories, definitions, and examples of cohesive devices are shown in Table 1 (summarized from Halliday, 2004).

Table 1. Types of Cohesive Devices

	Categories	Definitions	Subcategories	Examples
1	Reference	An item that is introduced at one place in the text is repeated.	Personals	he/him, they/them, she/her
			Demonstratives	this/these, that/those, here/there
			Comparatives	same, similar, other, more, so, better, else
2	Conjunction	Semantic links between clauses, paragraphs, or more.	Additive	and, also, moreover
			Adversative	but, yet, on the other hand
			Causal	therefore, consequently
			Temporal	next, before that, soon
3	Lexical cohesion	It comes through the selection of items that are related in some way to those that have gone before.	Repetition	dine/dining/dinner
			Synonym	sound/noise
			Antonym	sound/silence
			Hyponymy	tree-oak, pine, elm…
			Meronymy	tree-trunk, branch, leaf…
			Collocation	pipe-smoke, friends-relations
4	Ellipsis/substitution	When a speaker/writer presupposes something by either leaving out or using a substitute form, such as one or do.	Ellipsis	A: Why didn't you lead a spade? B: I hadn't got any.
			Substitution	He may do.

TSA (Lautamatti, 1987) was adopted as the second analytical framework to examine coherence of children's texts. First, we analyzed the topical structures by identifying the locations of the initial sentence element (ISE),[1] mood subject (grammatical subject), and topical subject. Five different types of combinations of the above three elements are illustrated in Table 2 with examples from participants' writing.

Table 2. Sentence Types in TSA

Types	Definitions	Examples
Type 1	ISE, mood subject, and topical subject coincide.	*The sun* was shining brightly in the sky.
Type 2	ISE is separated from mood subject and topical subject, which coincide.	*As soon as* Jane finished gardening, **Lily** had a suggestion.
Type 3	ISE and mood subject coincide while topical subject is separate.	*There* was an eagle near the palace that was protecting its nest.
Type 4	ISE and topical subject coincide, while mood subject is separate.	*Max* started play bowling but **he** keep on missing pins.
Type 5	ISE, mood subject, and topical subject are all separate.	*When* he reached at bowling alley, **he** was very nervous that everyone will laugh at him if he lost the game.

Note. ISE is italicized, mood subject is in bold, and topical subject in a square. ISE = initial sentence element.

Second, we analyzed the topical depth and progression. Topical depth is defined as "the longest sequential progression or combination of sequential progressions" (Witte, 1983, p. 188). According to Lautamatti (1987), there are three main types of topical progression, namely, (1) parallel, (2) sequential, and (3) extended parallel progression. We adopted the categorization of Schneider and Connor (1990), Knoch (2007), and Simpson (2000) to interpret the sequential progression. Table 3 summarizes the types of topical progression.

Table 3. Types of Topical Progression

	Types of Topical Progression	Definitions
1	Parallel progression (PP)	The subtopic is the same as the previous topic (<a,b>,<a,c>,<a,d>).
2	Extended parallel progression (EPP)	The topical subject of a sentence is readapted after a number of intervening sentences (<a,b>,<b,c>,<a,d>).
3	Direct sequential progression (DSP)	The rhematic part of the previous sentence becomes the topic of the consecutive sentence (<a,b>,<b,c>,<c,d>).
4	Indirect sequential progression (ISP)	It is similar to DSP, but the topic and rhematic part are only related by semantic sets (e.g., school/primary four students, Sally/Sally's drawing) (<a,b>,<b,c>,<c,d>).
5	Extended sequential progression (ESP)	The rheme element of a sentence being taken up as the theme of a nonconsecutive clause (<a,b>,<b,c>,<b,d>).
6	Unrelated sequential progression (USP) Topics are not clearly related to either the previous sentence topic or discourse topic (<a,b>,<c,d>,<e,f>).	Topics are not clearly related to either the previous sentence topic or discourse topic (<a,b>,<c,d>,<e,f>).

I examined writing quality in terms of 11 subcategories that were adapted from Wagner et al. (2011) with modifications. Firstly, three variables were coded to score the level of organization: (1) topic: whether the problem presented in the story is resolved (0 = not resolved or 1= resolved), (2) logical ordering of ideas: whether generated ideas are logically developed (1- to 4-point rating scale), and (3) number of key elements: whether seven story elements (who, when, where, event, problem, resolution, and ending)

were indicated in the story (presence of each element was given one score. The maximum possible score is seven). Two raters independently scored the texts. An inter-rater reliability was analyzed using the kappa statistic to determine the consistency among raters. Secondly, to examine the complexity of texts, (4) MLT and (5) clause density (total number of clauses per total number of T-units) were automatically scored by L2SCA (Yang et al., 2015). Thirdly, to investigate the productivity of the texts, (6) total number of words and (7) NDW were analyzed. NDW was automatically calculated using LCA (Lu, 2012). Lastly, to examine appropriate usage of spelling, punctuation, and grammar, (8) number of spelling errors, (9) number of capitalization errors, (10) number of errors involving period, and (11) number of tense errors were analyzed. SALT (Miller & Iglesias, 2015) were used to code the errors. A word that has repeated error in tense or spelling was only counted once.

The coding of data was as follows: firstly, the compositions were typed using Microsoft Word. The texts were divided into T-units, which were defined as "a single independent clause together with all of its modifying subordinate clauses" (Hunt, 1970, p. 4). Secondly, the number of cohesive devices were counted. The ellipsis/substitution seldom appeared in the children's texts of the current study, so this category was excluded in the analysis. To avoid the effect of length of texts, cohesion variables were controlled by calculating them per 100 words (Spiegel & Fitzgerald, 1990). In other words, the number of reference, conjunction, lexical cohesion, and total cohesive devices were adjusted per 100 words. Thirdly, the cohesive errors were also calculated (Fitzgerald & Spiegel, 1986; Spiegel & Fitzgerald, 1990; Yang & Sun, 2012). According to Spiegel and Fitzgerald (1990), the cohesive errors are defined as "the failure of the writer to supply a complete and unambiguous tie/referent pair" (p. 53). Two categories were examined as cohesive errors: (a) exophoric structures (e.g., "I saw Joey yesterday. He was lying on the beach.") in which the referent was not previously existed in the text, and (b) ambiguous structures (e.g., "The dog liked to guard the house and the postman could not make it to the door because he was barking."), in which the referent pronoun was not clear. The number of cohesive errors was calculated per 100 words.

Fourthly, types of sentence, topical depth, and topical progressions were analyzed using TSA. The sentence was the unit of analysis to analyze the types of sentence; T-units were the unit to analyze topical progression and depth (Witte, 1983). The proportion of each variable was calculated to avoid the negative effect of the text length. Lastly, the quality of writing was analyzed. Three items including topic, logical ordering of ideas, and number of key elements were scored by two raters. Using Cohen's kappa to determine the interrater reliability, there was almost perfect agreement: $\kappa\,(57) = .91, p < .001$. NDW and the number of spelling, capitalization, period, and tense errors, were divided by the total number of words to obviate the confounding effects from the text length.

Independent-samples t-tests were performed to compare the two proficiency groups (low and high) while analyzing research questions 1 and 2 to investigate the dependent variables, which are each number of cohesive devices per 100 words and the ratio of types of sentence, topical depth, and progressions. Additionally, a Pearson r was determined to assess the relationship between cohesion and quality of writing (to address RQ3: does the usage of cohesive devices correlate to writing quality?) and coherence and writing quality (to address RQ4: does coherence of texts correlate to writing quality?).

Results

RQ1: What is Grade 4 students' usage of cohesive devices in narrative writing?

The statistical difference for the use of reference ($t = -3.261$, $p = .005$, $d = 1.5$), lexical cohesion ($t = -3.061$, $p = .009$, $d = 1.48$), and total number of cohesive devices ($t = -3.580$, $p = .003$, $d = 1.66$) among the two proficiency groups was significant (see Table 4).

Table 4. Means, Standard Deviation, Independent-Samples t-Test and Effect Size Results for Each Category of Cohesive Devices

Cohesive Devices	Low Proficiency		High Proficiency		t	p-Value	d
	Mean (SD)	N	Mean (SD)	N			
Reference	26.09 (10.23)	11	38.38(6.11)	8	−3.261	.005	1.50
Conjunction	10.73 (4.00)	11	14.50 (4.47)	8	−1.897	.78	0.89
Lexical cohesion	15.64 (5.99)	11	21.63 (2.13)	8	−3.061	.009	1.48
Total number of cohesion devices	52.45 (17.46)	11	74.5 (9.04)	8	−3.580	.003	1.66

However, the number of cohesive devices per 100 words showed different results. An independent-samples t-test indicated that the number of cohesive devices per 100 words did not significantly differ according to the proficiency groups. The means of each category per 100 words did not show much difference. Both groups might have used similar number of cohesive devices per 100 words.

Concerning the number of cohesive errors per 100 words, the high-proficiency group showed significantly less lexical cohesion errors compared to the low-proficiency group (t = 2.30, p = 0.44, d = 1.35). The high-proficiency group consistently produced less cohesive errors in all categories, although they were statistically insignificant.

RQ2: Is there a significant difference between the high-proficiency group and low-proficiency group in terms of topical structure progression in narrative writing?

Sentence Type 1 was mostly produced (40.59 % of the low-proficiency group and 30.31% of the high-proficiency group) followed by Sentence Type 2 (25.55% and 23.45%, respectively). For Sentence Type 3, the high-proficiency group (M = 21.53, SD = 9.48) showed statistically higher proportion, compared with the low-proficiency group (M = 9.61, SD = 10.46), t = −2.591, p = .020, d = 1.2. In other words, the higher proficiency group of students tended to use more complex sentence types than the lower proficiency group.

The higher proficiency group also showed a lower topical depth ratio (M = .36, SD = .12) than the lower proficiency group (M = .32, SD = .08). The difference was not statistically significant: t = .874, p = .394, d = −.40.

There was no statistically significant difference among the two proficiency groups in terms of topical progression, except the sum of indirect and direct sequential progression: t = 2.716, p = 0.16, d = −1.17. In other words, the low-proficiency group (M = .18, SD = .08) used significantly more direct and indirect sequential progression per total topical progressions than the high-proficiency group (M = .11, SD = .04). Overall, parallel and extended parallel progression were presented regardless of the proficiency group. In other words, participants tended to write a narrative story using parallel (PP) and extended parallel (EP) progression rather than sequential progression (SP).

RQ3: How does the usage of cohesive devices correlate to writing quality?

Quality of Writing

Independent-samples *t*-test was conducted to elicit any significant differences between the two proficiency groups regarding writing quality. Seven out of 11 categories showed significant differences among the two proficiency groups. The high-proficiency group obtained significantly higher scores in topic (t = −2.28, p = 0.46, d = 1.39) and logical ordering of ideas (t = −4.01, p = .002, d = 2.41). In addition, they wrote longer texts (t = −4.24, p = .001, d = 2.02) and used more variety of words (t = −3.69, p = .002, d = 1.71).

In terms of errors, the high-proficiency group produced significantly less tense ($t = 3.38$, $p = .004$, $d = -1.57$), capitalization ($t = 2.55$, $p = .027$, $d = -1.31$), and punctuation ($t = 3.22$, $p = .005$, $d = -1.48$) errors per 100 words.

Correlation Between Quality of Writing and Cohesion

Pearson's r was used to correlate 11 indices of writing quality and five cohesion categories adjusted per 100 words. The relationship was not statistically significant except the correlation between capitalization error per 100 words and total cohesive errors per 100 words ($r = .478$, $n = 19$, $p = .038$). In other words, students who produced more capitalization errors tended to present more cohesive errors (per 100 words).

However, 11 subcategories of writing quality and five cohesion subcategories were significantly correlated within the same supercategories. For instance, logical ordering of ideas was positively correlated to the number of words ($r = .686$, $n = 19$, $p = .001$) and NDW ($r = .765$, $n = 19$, $p = .000$) but negatively correlated to number of capitalization errors per 100 words ($r = -.583$, $n = 19$, $p = .009$). In other words, students who gained higher scores in logical ordering of ideas wrote longer texts using more different words and committed less capitalization errors. In terms of cohesion, total cohesive errors per 100 words were significantly correlated to the number of references per 100 words ($r = .887$, $n = 19$, $p = .000$) and the number of conjunctions per 100 words ($r = .673$, $n = 19$, $p = .002$).

RQ4: How does coherence of texts correlate to writing quality?

Pearson's r test was conducted to figure out the correlation between coherence and quality of writing. Coherence, which was examined by TSA, showed a number of significant correlations with sentence types and topical progression.

Correlation Between Types of Sentence and Writing Quality

First, logical ordering of ideas was positively correlated to Sentence Type 3 ($r = .549$, $n = 19$, $p = .015$). Students who obtained higher scores in the logical ordering of ideas wrote more Sentence Type 3. Second, the number of words was positively correlated to Sentence Type 3 ($r = .615$, $n = 19$, $p = .005$) but negatively correlated to Sentence Type 1 ($r = -.669$, $n = 19$, $p = .002$). That is, students who wrote longer texts produced more Sentence Type 3 but less Sentence Type 1. NDW is significantly correlated to Sentence Type 3 ($r = .577$, $n = 19$, $p = .010$) and Type 1 ($r = -.655$, $n = 19$, $p = .002$). Students who produced various words tended to write more with Sentence Type 3 and less Sentence Type 1.

Correlation Between Topical Progression and Writing Quality

In terms of the correlation between topical progression and quality of writing, logical ordering of ideas showed significant positive correlation with unrelated sequential progression ($r = .489$, $n = 19$, $p = .034$). Tense error per 100 words and indirect sequential progression are significantly correlated ($r = .601$, $n = 19$, $p = .006$). That is, students who obtained higher score in logical ordering of ideas presented more unrelated sequential progression. Students who produced more tense errors while writing tended to use more indirect sequential progressions. Results indicated that students with low writing quality may produce more indirect and less unrelated sequential progression. This result was positively correlated to our finding that the low-proficiency group of students showed significantly higher proportion of using sum of direct and indirect sequential progression.

Discussion

The usage of cohesive devices per 100 words was almost identical in both groups, with the higher proficiency group producing less cohesive errors per 100 words. Sentence Types 1 and 2 were frequently used by both groups. The high-proficiency students preferred using Sentence Type 3 compared to the low-proficiency group. In terms of writing quality, the high-proficiency group obtained significantly higher scores in 7 out of 11 elements. The writing quality is related to coherence at the global level, rather than cohesion at the local level.

Usage of Cohesive Devices Versus Cohesive Errors

Results showed that using cohesive devices as the parameter of the quality of writing was inconclusive. This finding is consistent with the research results

reported by Struthers et al. (2013). The similarity could be due to the fact that simple counts (including adjusting per 100 words) of cohesive devices may not be accurate to capture how coherent the texts were written.

Cohesive errors may serve as a predictor of the quality of writing. The high-proficiency group did not show any lexical cohesion errors in the texts. The finding is consistent with Yang and Sun's (2012) finding that senior university students in China showed a decrease in lexical cohesion errors per 100 words compared to sophomores. The findings of my study may suggest that overall correct usage of cohesive devices was positively correlated to writing quality.

Types of Sentence

Regardless of proficiency groups, Sentence Types 1 and 2 were commonly used. The finding is consistent with the research results reported by Simpson (2000) and Flores and Yin (2015). Simpson found that 40% of Type 1 and 27% of Type 2 were elicited in selected 40 paragraphs from articles published in academic journals. Our results complement those of Simpson using a significantly different population from elementary school students.

Sentence Type 3 was commonly used by high-proficiency students. Our finding seems to be contradictory to those of Flores and Yin (2015). In Flores and Yin's (2015) study, there was no significant difference in Sentence Type 3 produced by high-proficiency and low-proficiency students. However, it should be noted that Flores and Yin (2015) worked with first-year college students writing comparison-and-contrast essays. In our study, children tended to use simple structures, rather than complex sentences that include independent and dependent clauses.

Topical Depth and Topical Progression

Results show that the high-proficiency group demonstrated less topical depth compared to the low-proficiency group. This finding is consistent with the research results reported by Witte (1983) that less topical depth was an indicator of high-scoring essays. In a story with more than one character, new topics may appear within the same story. Therefore, taking a topical depth as a variable to measure the coherence and quality of writing needs to be carefully interpreted considering the genre.

In terms of topical progression, the lower proficiency group tended to use significantly more direct and indirect sequential progression. This finding is consistent with the research results reported by Witte (1983). A greater percentage of sequential progressions was positively associated with low-scoring texts. TSA is mainly used to measure the coherence of academic essays rather than narrative genre (e.g., Flores & Yin, 2015). Factors such as different genre, context (ESL or EFL), and proficiency level of the participants may affect the topical progression.

Correlation Between Writing Quality and Cohesion Versus Coherence

Results show that sentence types and topical progression are correlated to writing quality. According to subcategories of cohesion indices, only total cohesive errors per 100 words were positively correlated to capitalization errors per 100 words. In contrast, indices of coherence that were measured by TSA showed a number of elements that were correlated to writing quality. Overall, students who obtained higher scores in logical ordering of the idea showed higher percentage of Sentence Type 3. Greater usage of Type 3 and less usage of Type 1 could be the predictor of high-scoring texts. Our finding seems to be contradictory to those of Witte (1983). The participants in Witte's (1983) study showed a decrease in usage of Sentence Types 3 and 5 to increase readers' comprehensibility, as complex sentence types may slow down readers' understanding of the main topics.

In Lee's (2006) study examining the effect of intensive teaching of coherence-creating mechanisms among ESL secondary school students, participants used Sentence Type 3 to help readers link former and latter sentences to achieve local coherence. Our finding is consistent with the research results reported by Lee (2016). However, it should be noted that Grade 4 ESL students are still in the process of learning to write. The high-proficiency group tended to use syntactically more complexed T-units in MLT, though it was not statistically significant ($t = -1.10, p = .288, d = 0.51$).

Logical ordering of ideas was positively correlated to unrelated sequential progression. The higher score in logical ordering of ideas tended to represent higher quality of writing, whereas unrelated sequential progression might be correlated to incoherent texts (Knoch, 2007). The finding of the increased use of direct and indirect sequential progression among the

lower proficiency group seems to be contradictory to those of Knoch (2007). For narrative genre, skilled writers are able to develop the paragraph or sustain readers' interest by elaborating on the main characters' actions and feelings.

Extensive and elaborated descriptions of main characters (McKeough et al., 2007) might be achieved by parallel and extended parallel progression, rather than sequential progression. Students are able to write about characters who have the specific characteristics to control the story plot. McKeough et al. (2007) explain that a children's story develops from simple action-oriented plots to a more complicated storyline including action as well as mental states.

Conclusion

Assessing coherence of narratives using TSA rather than holistic rubric was underexplored in ESL/EFL research. It is important to teach the appropriate usage of cohesive devices in L2 children's writing classrooms. The lower proficiency group tended to overuse *and*, *so*, and *then* in the current study. In addition, they may not have enough knowledge of lexical collocation compared to the higher proficiency group. Through explicit teaching of cohesive devices, cohesion and coherence can be improved by using appropriate cohesive devices to connect the sentences and ideas (Alfalagg, 2020). Explicit teaching of cohesive devices may include teaching of pronoun references, repetition, conjunctions, synonymy/antonymy, and superordinates/hyponymy. Second, the findings suggest that using parallel and extended parallel progression to elaborate the characters' action and feelings may help improve narrative writing quality. Lastly, using TSA to analyze coherence is time-consuming for teachers. Teachers may explore other ways of measuring coherence of writing. For example, Knoch's (2007) TSA scale and the checklist developed by Struthers et al. (2013). Future studies could validate the checklist or TSA scale to measure children's cohesion or coherence in ESL/EFL setting. Though the present study provided evidence of cohesion and coherence of L2 children's writing and their writing quality, some limitations remained. The small sample size of participants should caution the readers not to overgeneralize the findings in other L1 or L2 settings. Future research should note that writing quality and syntactic features vary in languages and genres (van Rijt et al., 2021).

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