

Comparisons of L2 Learners' Written Performance by Two Types of Error Analysis

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This study compares the results of linguistic errors of Korean EFL college learners' corpus with two types of error analysis. 86 female college students participated in the study, and wrote a narrative essay through the *Criterion*®. After their essays were rated by *e-rater*®, they were divided into three proficiency groups according to writing scores and then linguistic errors were classified, based on Ferris' (2002) error classification. All linguistic errors were analyzed by two different frames such as conventional analysis (i.e., the number of each error type and its percentage) and T-unit analysis (i.e., the number of each error type was divided by T-unit). Through the comparison of two error analysis, morphological errors were the most frequent, followed by lexical errors across writing proficiency levels. Syntactic errors were the least frequent among these three main types of errors. The same results arose from two different error ratio measures, but error distribution across writing proficiency levels differed. In particular, error ratio measures with T-units yielded more accurate results when analyzing error distribution across writing proficiency levels. The findings suggest that error analysis through this new ratio measure presents more verifiable results than through conventional analysis.

[error analysis/error ratio measures/오류분석/오류비율측정]

I. INTRODUCTION

Since the 1970s, studies on language learners' errors have emerged as a major field of study, and researchers have approached the investigation of linguistic developmental stages from various angles such as error analysis (Corder, 1967) and interlanguage development (Selinker, 1972). In particular, increasing academic interest concerning errors in connection with linguistic developmental stages has brought about developmental sequence and index studies in second language acquisition.

Corder (1967) claims that language learners' errors become evidence of language systems that they learned or used at certain stages of second language acquisition. That is, language learners' errors are considered meaningful data in the target language by researchers and instructors, because these errors present what and how much language learners have learned or acquired in the target language system. This is an aspect of "developmental sequence studies," which aims to examine the "acquisition orders for morphosyntactic features of language based on error and performance analysis" (Wolfe-Quintero, Inagaki, & H. Y. Kim, 1998). For this reason, L2 learners' errors are classified into certain error types, based on researcher's definition of errors, and those errors are measured by error analysis.

Echoing Corder (1967), Selinker (1972) regards interlanguage as learners' unstable, yet continually developing second language systems in written/spoken contexts. Within this frame, many researchers have also attempted to measure L2 learners' language development in terms of complexity, accuracy, and fluency (Ellis, 1989; E. Hwang, 2012; Norris & Ortega, 2009; Ortega, 2003). Wolfe-Quintero et al. (1998) claim that it is a part of "developmental index studies" that attempts to "gauge the development of learners at known proficiency levels through the use of fluency, accuracy, and complexity measures that are not necessarily tied to particular structures" (p. 2). For measuring accuracy in a given context, researchers observe, through error ratio measures such as error-free T-units per T-unit¹ (EFT/T) or errors per T-unit (E/T), how accurately language learners produce the target language.

In developmental sequence studies and the developmental index studies both, L2 learners' errors have been examined by error analysis and accuracy measures, respectively. These studies have yielded meaningful and valuable findings regarding L2 learners' language systems, but their methodological differences in approaching errors make it impossible to apprehend a comprehensive picture of L2 learners' errors. In other words, results from "developmental sequence studies" have provided results of error distribution by using the number of each error type and its percentage of overall errors (K. A. Cha, 2004; J. Y. Kim, 1998; C. Park, 1998). In the process of error analysis, however, counting error frequency is not enough to effectively measure the degree of language learners' errors objectively, and the results do not reflect a verifiable index at the level of the language learner's developmental stage, because the results cannot be compared to each other. Conversely, the results of "developmental index studies" have provided some types of error ratios such as error-free T-units per T-unit (EFT/T) or errors per T-unit (E/T). These given results could be compared with others within the objective index; however, the

¹ T-unit: "one main clause plus any subordinate clause or nonclausal structure that is attached to or embedded in it" (Hunt, 1970, p. 4)

ratio does not show what particular type of linguistic form language learners used correctly or incorrectly.

In an attempt to integrate two perspectives concerning error analysis in order to reach a more comprehensive understanding of errors, the present study is designed to examine Korean EFL college learners' written performance, especially focusing on linguistic errors (e.g., morphological, lexical, and syntactic errors). A written corpus is compared through two different error analyses (i.e., a conventional analysis and a T-unit analysis) based on Ferris' (2002) error classification system across writing proficiency levels. One is the commonly used frame of error analysis, which uses the number of errors and its percentage of overall errors. The other is error analysis, which uses T-units. Based on these two error analyses, research questions for the present study are as follows:

1. What are the characteristics of errors made by Korean EFL learners as examined by error analysis using the number of errors and its percentage of overall errors, with respect to morphological, lexical, and syntactic error types?
2. What are the characteristics of errors made by Korean EFL learners as examined by error analysis using T-units, with respect to morphological, lexical, and syntactic error types?
3. To what extent are the results of two different error analyses similar?

II. LITERATURE REVIEW

1. Error Analysis and Error Classification

Errors are normal and inevitable features made by language learners. That is, if a regular pattern of errors is found in written production across proficiency levels, and if a learner reveals changes in those patterns across proficiency levels, errors become an index to measure achievement in learning (Ellis, 1997). Similarly, error analysis is a crucial tool for investigating the process of second language acquisition, and provides fundamental information about learners' language systems (Corder, 1967). Error analysis, focusing on the comparison of errors between those "a learner makes in producing the target language and the target language form itself," attempts to provide a broader range of possible explanations of an underlying rule-governed system (Gass & Selinker, 2008, p. 102).

For analyzing errors, two representative error classification frames were used, and error distribution was described in many previous studies as the total numbers of each type of error and its percentage of overall errors. First, Dulay, Burt and Krashen (1982) classified errors into four main areas: linguistic taxonomy, surface structure taxonomy, comparative

taxonomy, and communicative effect taxonomy. However, most researchers studying error analysis used a linguistic taxonomy that includes six main domains (e.g., noun phrase, verb phrase, clause, sentence, prepositional phrase, adjective phrase, and others). With a revised form of Dulay et al.'s (1982) frame of error classification, several related studies were conducted in the Korean context (K. A. Cha, 2004; J. Y. Kim, 1998; C. Park, 2007).

J. Y. Kim (1998) investigated written errors produced by 200 tenth grade Korean students within six domains and 22 subtypes of errors. J. Y. Kim analyzed errors by the number of individual errors and its percentage of overall errors based on defined error classifications. J. Y. Kim revealed that articles/determiners (25.4%) were the most frequent errors, and awkward expressions (14.3%) occurred most frequently after those, followed by incorrect verb complements (9.6%) in given written productions. However, J. Y. Kim's study presented the overall errors made by Korean learners; it could not clarify the degree of language learners' mastery of certain forms in accordance with their proficiency levels because of the lack of information of their L2 proficiency.

K. A. Cha's (2004) study, conducted using a similar frame to J. Y. Kim's (1998), analyzed the number of errors and corresponding percentage of overall errors to identify written error types made by 115 Korean university students. K. A. Cha found that Korean university students produced more frequent errors in vocabulary or expression (19.2%), determiners (17.49%), and verbs (19.81%) than other error types. Even though J. Y. Kim (1998) and K. A. Cha (2004) used the same frame of error classification, the results from these two studies did not show the same pattern of errors. To compare the results of errors related to articles/determiners, for instance, J. Y. Kim's study indicated an error ratio of 25.4%, while K. A. Cha's study showed an error ratio of 17.49%. Using only the number of errors and its overall percentage of errors to indicate error distribution provides a partial picture of the errors made by of the individuals. Moreover, these results could not be compared to those of other studies, because this measure is affected by the number of participants and their proficiency levels.

In C. Park's (2007) study, 257 writing samples from 33 university students were analyzed regarding three types of error (i.e., grammar, contents, organization) which consisted of sub-categories of errors² and contributing variables in writing samples across three proficiency levels. C. Park attempted to examine the relationship between the pattern of errors and the level of writing performance through multiple regression analysis. C. Park found that certain error types, such as sentence types in general (grammar), contents (e.g., meaning, word choice, and parallelism), and connectives (organization) were strongly

² Basic sentence types, subject and verb agreement, sentence types in general, main verbs, noun agreement, conjunction, contents 1 (redundancy, logic, and style), contents 2 (meaning, word choice, and parallelism), usage, and organization (connectives)

correlated with writing performance.

In contrast with Dulay et al. (1982), Ferris (2002) analyzed common errors of ESL learners, and identified five main types of errors: morphological, lexical, syntactic, mechanical, and miscellaneous errors with fifteen subtypes (see Appendix A). J. Lee (2009), with using Ferris' error classification system, conducted an error analysis study with involving 23 university students, and compared students' writing before and after lessons. In the pre-test, J. Lee found that punctuation errors (mean = 3.39) were the most frequent, and word choice (mean = 2.48) was next, followed by sentence structure (mean = 1.78). In the post-test, which was conducted after giving feedback to participants, errors in sentence structure (mean = 2.43) was the most frequent, and punctuation error (mean = 1.91) was next, followed by articles/determiners (mean = 1.43). J. Lee concluded that after giving feedback concerning errors students had made during the pre-test, a high proficiency group made fewer errors than a low proficiency group. Also, morphological, lexical, and syntactic errors show statistically significant differences between pre- and post-tests ($p < .10$). However, J. Lee's study had several limitations. First, J. Lee did not use the actual number of each type of error and its percentage of overall errors, but instead used mean values and standard deviations without providing any detailed information regarding how he calculated these numbers in details. Moreover, J. Lee set a statistics' standard of significance as $p < .10$ in the first place, which made the results statistically less reliable.

The present study used Ferris' (2002) error classification system due to its more unambiguous definition of error classification, and its wider and more recent acceptance in the field. The present study focused on linguistic errors, thus raters counted only lexical, morphological, and syntactic errors while except mechanical ones while excluding those errors found to be mechanical in nature (e.g., punctuation, spelling, capitalization). For this reason, the results of Ferris' error analysis of ESL learners' written production were recalculated by the researcher. The given results from both the present and Ferris' studies were compared to examine error patterns and ratios between Korean EFL learners' and ESL learners' written productions.

2. Accuracy Measures

Measuring linguistic accuracy is one of the main research areas found within developmental index studies. Studies related to second language learners' written productions have used various measures of linguistic accuracy (e.g., morphological, syntactic, and lexical accuracy), depending on the purpose of each research question. Linguistic accuracy refers to "freedom from error" in grammar, vocabulary, and any complexity of clauses (Foster & Skehan, 1996). Ellis (1994) defined errors as a "deviation

from the norms of the target language.”

One way of measuring linguistic accuracy is to gauge error ratios such as error-free T-units per T-unit (EFT/T) or errors per T-unit (E/T). Particularly, E/T is considered as the best predictor applicable to all L2 proficiency levels. However, EFT/T is not applicable if a group consists of only less advanced learners (Wolfe-Quintero et al., 1998). According to Wolfe-Quintero et al., “second language learners write more accurately, or produce fewer errors in their writing, as they become more proficient,” (p. 4) in the aspect of development in terms of accuracy.

In this respect, many studies have been conducted with these measures in mind. Hirano (1991) used EFT/T to measure accuracy with 158 EFL Japanese university students who consisted of three proficiency levels. Hirano found that there was a significant relationship between EFT/T and language learners’ proficiency. That is, as learners’ L2 proficiency level increases, the ratio of EFT/T increases accordingly. In the case of E/T, Perkins (1980) investigated relationships between holistic ratings of essays and E/T with 29 university students who consisted of three groups, and found significant relationships between them. Bardovi-Harlig and Bofman (1989) used three types of errors (i.e., syntactic, morphological, and lexical errors) to examine accuracy with 30 ESL university students of two groups (pass vs. non-pass for a placement test). Bardovi-Harlig and Bofman calculated the number of errors per clause for each error type and used morphological errors per clause (MorR/C), syntactic errors per clause (SynE/C), and lexical errors per clause (LexE/C). In Bardovi-Harlig and Bofman’s study, morphological errors were the highest most frequent error type in the two groups, but showed near-significant differences between the pass and non-pass groups. The second most frequent errors were lexical errors, which showed statistically significant differences between the two groups. The last type of error, syntactic errors, was the lowest least frequent among the three error types, and there were no significant differences between groups.

In the Korean context, there exist few studies conducted to measure linguistic accuracy. E. Hwang’s (2012) study is the latest study to measure Korean EFL college learners’ language developmental patterns. To measure linguistic accuracy, E. Hwang used three types of measures (i.e., error-free T-units, error-free T-units per T-unit, errors per T-unit), and found that error-free T-units (EFT) tended to increase as language learners’ proficiency increases, and statistically significant differences appeared among all three groups. However, error-free T-units per T-unit (EFT/T³) and errors per T-unit (E/T) showed different patterns. For instance, E/T tended to decrease as writing proficiency levels increased, but there was no level difference between beginner and intermediate levels

³ EFT/T had the same pattern with E/T but in the positive direction because EFT increases as writing proficiency increases.

through multiple comparison tests. That is, beginner and intermediate levels were adjacent groups, and only the high-intermediate level showed significant differences among the three groups with regard to linguistic accuracy.

Previous studies have been helpful to broaden our understanding of linguistic accuracy and the measures of gauging each type of error. However, considering the fact that language learners' linguistic accuracy tends to increase as L2 proficiency levels increase, these accuracy measures do not show reflect a thorough analysis of what types of errors increase or decrease in accordance with L2 proficiency levels.

III. METHODOLOGY

1. Setting and Participants

Eighty-six Korean university students from two courses in the spring semester of 2012 participated in the study. Thirty-five students took the general English course (i.e., English Reading and Writing) and the remaining fifty-one students took an English major course (i.e., Introduction to English Language). Table 1 illustrates descriptive statistics regarding the participants' writing test scores. Based on the subjects' scores on the writing test, a one-way ANOVA test was conducted on the different proficiency groups. The results showed that the three groups were statistically and significantly different from each other. The beginner level consisted of 19 students with scores of 1 and 2. The intermediate level was comprised of 31 students with a score of 3. The remaining group, the high-intermediate level, was comprised of 30 students with a score of 4, 5 students with a score of 5, and 1 student with a score of 6.

TABLE 1
Descriptive Statistics of the Participants' Writing Test Scores⁴

Level	Total No. of Subjects	Mean (SD) (p < .01)	Writing Score	Score Description	No. of Subjects
High-intermediate	36	4.22 (0.48)	6	excellent	1
			5	skillful	5
			4	sufficient	30
Intermediate	31	3.00 (0.00)	3	uneven	31
Beginner	19	1.89 (0.32)	2	insufficient	17
			1	unsatisfactory	2

A one-way ANOVA test was conducted.

⁴ *Source:* From "Korean EFL learners' language development across proficiency levels in written productions" by E. H wang (2012).

The participants consisted of 45 (52.3%) freshmen, 21 (24.4%) sophomores, 13 (15.1%) juniors, and 7 (8.1%) seniors. Their average age was 21.29. More than half percent of students were freshmen. Most of them had no experience in English writing, and had never taken a formal English writing class. 32 (37.2%) students responded that they had experience in traveling or going abroad to English speaking countries. However, 18 (56.3%) students had visited English-speaking countries for less than three months, while 7 (21.88%) students had stayed in English speaking countries for six months to one year for study or family business. The last 7 (21.88%) students also had lived in English speaking countries for an average of 2 years for study or family business.

2. Tasks and the Procedures

In the second week of the semester, the participants took a web-based writing test as a course requirement. The writing test was conducted through the *Criterion*® online writing evaluation service in a language laboratory. Before taking the test, they listened to explanations about the process of the test, and completed a 10-minute questionnaire designed to survey their background, written in Korean (e.g., grade, major, English education background, etc.) in 10 minutes. Then they wrote a narrative essay from the given writing prompt⁵ for 40 minutes. Submitted essays were rated from one to six based on the scale provided by the *e-rater*® engine on the *Criterion*® online writing evaluation service (see the writing sample in Appendix B). Based on the writing scores ranging from 1 to 6, the writing samples were divided into three different proficiency levels (e.g., beginner, intermediate, and high-intermediate levels) to compare error distribution among groups.

3. Learner Corpus

86 submitted essays were analyzed by WordSmith Tools 6.0. Table 2 indicates general information regarding the learner corpus across three writing proficiency levels. The total tokens used for the word list were 23,974, the total types were 2,319, and the total sentences were 1,882. The essay length varied from 87 to 688 words per composition, and the average essay length was 278.77 words.

Most of elements in Table 2 show an increasing linear tendency as writing proficiency levels rise (e.g., tokens, types, mean length of essay, etc.). STTR⁶ also showed increases;

⁵ *Writing prompt*: Write an essay about what you will do to reach your goals. Tell the story of how you will achieve your goals. Be as specific as possible in describing the obstacles and challenges you might face on the road to success.

⁶ STTR (standardized type/token ratio): mean TTR of all 50 word segments

however, there is no statistically meaningful difference between the intermediate (mean = 75.30) and high-intermediate (mean = 76.43) levels. An interesting point is that the mean length of words is highest in the intermediate level (mean = 4.29), and it is slightly higher than in the high-intermediate level (mean = 4.27).

TABLE 2
The Learner Corpus in the Study

Level	No .of Texts	Tokens	Types	STTR	Sentences	Mean Length (SD)		
						Word	Sentence	Essay
Total	86	23, 974	2,319	75.50	1,882	4.26 (2.50)	12.74 (6.49)	278.77 (100.7)
3	36	13,121	1,662	76.43	896	4.27 (2.47)	14.64 (6.45)	364.47 (82.98)
2	31	7,694	1,247	75.30	647	4.29 (2.57)	11.89 (6.11)	248.19 (44.13)
1	19	3,159	674	71.62	339	4.15 (2.46)	9.32 (5.48)	166.26 (40.77)

4. Analysis

An automated evaluation system, *e-rater*®, an electronic writing evaluation product developed by the American Education Test Service (ETS), was used to rate participants' essays. It provided holistic scores ranging from one to six concerning grammar, usage, mechanics, style and organization, and development. As a first step to analyze errors, linguistic errors in 86 written productions were identified and coded by one native-English-speaking instructor teaching an English writing course at university. The rater identified morphological, syntactic, lexical errors through Ferris' (2002) error classification system, excluding mechanical errors (e.g., spelling, punctuation, capitalization). To investigate the degree to which raters can achieve agreement concerning error classification of the same written productions, and to measure the reliability of their judgment, 10 writing samples out of 86 written productions were randomly selected and coded by a second native English-speaking instructor teaching at the same university as the first. After a cross-analysis checking of the results, interrater reliability scores for all measures turned out to be measured at over 95 percent ($p < .05$).

Then, all checked errors were classified based on Ferris' (2002) classification of errors, and counted by the researcher to measure accuracy. That is, three main error types with 13 subtypes of errors were calculated by the number of errors and its percentage of overall errors. Furthermore, each error type was recalculated by T-unit to standardize the results. Then, a statistical analysis of the data was performed using SPSS version 18.0. Data are reported as mean values (M) and standard deviations (SD) for continuous variables. A

Kruskal-Wallis test was performed on the measures, and Spearman's rank correlation coefficient was used to examine correlations between an accuracy measure (E/T) and three main error types with 13 subtypes of errors across three writing proficiency groups.

IV. RESULTS AND DISCUSSION

1. Error Analysis using the Number of Total Errors and Its Relative Ratios

In order to answer to the first research question with respect to error analysis, every morphological, lexical, and syntactic error was analyzed by using the number of each type of errors, and converted into a percentage. Table 3 indicates descriptive statistics of error analysis used in the current study, and also shows a comparison with Ferris' (2002) results of error analysis. Table 4 shows the total number and a percentage of errors within each writing proficiency level. Based on Ferris' error classification system, a total of 13 error types within three main types across three writing proficiency levels were compared to examine some similarities and differences among them. To compare this data with Ferris' results, the results from the present study were recalculated as a new percentage excluding mechanical errors.

Seen in Table 3, a total of 1,159 errors were found in 86 written productions. Within the three types of errors, the highest error type was morphological errors (MR, N = 557, 48.2%), and articles/determiners error (ART, N = 256, 22.2%) related nouns (NOUN) was the most frequent sub-error type in the present study. These results, in which morphological errors (MR) were highest among the three main error types, support Ferris' study (42.6%); however, the ranking order of errors among sub-error types was different, and sometimes reversed in both studies. In comparison with the results of Ferris, the present study indicates that error frequency related to nouns (NOUN, N = 341, 29.6%) was higher than error frequency related to verbs (VERB, n=216, 18.6%). Moreover, the current study indicates that the most frequent sub-error type within morphological errors was articles/determiners (ART, N = 256, 22.2%) in nouns. Its converted percentage was very similar to J. Y. Kim's (1998) result (25.4%), as well.

In the present study, the second most frequent error type was lexical errors (LX, N = 434, 37.6%), and language learners made the most frequent errors regarding word choice (WC, N = 246, 21.3%), followed by word form (WF, N = 151, 13.1%). In Ferris' (2002) study, the most frequent error type was also word choice (WC, 13.2%), followed by word form (WF, 7.4%) in lexical errors; however, the second most frequent error type among the three main types was syntactic errors (SN, 31.2%). In the present study, syntactic errors indicated the least frequent errors among three types, and error ratio (8.6% vs. 25.8%) was much less than that shown in Ferris' study.

In summary, Korean EFL learners made the most frequent errors of morphological type (MR, 48.2%), and the second most frequent errors of lexical type (LX, 37.6%), and followed by syntactic type (SN, 14.2%). When comparing ESL learners' performances with Ferris' (2002) results, morphological errors showed very similar error ratios (48.2% vs. 42.6%), but the subtype's error ratios showed different patterns. In the present study, error related nouns (NOUN, 29.6%) indicated higher error ratios than errors related to verbs (VERB, 18.6%), and articles/determiners errors (ART, 22.2%) in morphological errors were three times higher than Ferris' results (ART, 7.6%). Lexical errors showed higher frequency in the current study than in Ferris' investigation. Word choice (WC, 21.3% vs. 13.2%) and word form errors (WF, 13.1% vs. 7.4%) were almost two times higher in this study. However, syntactic errors, especially sentence structure errors (SN, 8.6% vs. 25.8%), were three times lower than Ferris' result in this study. In comparison with the other cases of Korean EFL learners' (J. Y. Kim, 1998) error analysis, the first and the second most frequent error types were similar, even though there were some differences between converted percentages (e.g., ART, 22.2% vs. 25.4%; WC, 21.3% vs. 14.3%).

TABLE 3
Descriptive Statistics of Error Analysis of Current Study

Type of Error	Sub-type	Code	Freq.	% of Errors (current study)	% of Errors (Ferris' study)
Morphological Errors (MR)	<i>Verbs</i>	VERB			
	Tense	VT	80	6.9	12.5
	Form	VF	80	6.9	8.9
	Subject-verb agreement	SV	56	4.8	3.3
	Total verb Errors		216	18.6	24.7
	<i>Nouns</i>	NOUN			
	Articles/determiners	ART	256	22.2	7.6
	Noun endings	NE	85	7.4	10.2
	Total Noun errors		341	29.6	17.9
	Total MT Errors		557	48.2	42.6
Lexical Errors (LX)	Word choice	WC	246	21.3	13.2
	Word form	WF	151	13.1	7.4
	Informal usage	IU	3	.3	.3
	Idiom error	IE	5	.4	.9
	Pronoun error	PE	29	2.5	3.3
	Total LX Errors		434	37.6	25.2
Syntactic Errors (SN)	Sentence structure	SS	99	8.6	25.8
	Run-ons	RS	8	0.7	3.3
	Fragments	SF	55	4.8	2.1
	Total SN Errors		162	14.2	31.2
Miscellaneous		MS	2	.2	1.0
Total Number of Errors Marked: 1159					

To compare with Ferris' (2002) result, the data were recalculated except the mechanical errors.

Table 4 illustrates group differences through error analysis. With respect to the three main types of errors, all three writing proficiency levels produced the most frequent errors in morphological errors, and produced the least errors in syntactical errors. In the case of level 1, they made 281 errors of 3,159 words in 19 compositions. The morphological (N = 122, 43.3%) and lexical (N = 109, 38.9%) errors were not significantly different, while syntactic errors (N = 50, 17.8%) showed lower values than the others. Levels 2 and 3 indicated the same order of error ranking within the three main error types. For instance, the most frequent error was morphological errors (50.9% vs. 51.1%), the second most frequent error was lexical errors (35.5% vs. 37.2%), and was followed by syntactic errors (13.6% vs. 11.8%) in two groups; however, it is not possible to conclude that these groups made the same ratio of errors because level 2 made a total 434 errors out of 7,694 words, and level 3 made a total 452 errors out of 13,121 words.

TABLE 4
Descriptive Statistics of Error Analysis across Writing Proficiency Levels⁷

Type of Error	Sub-type	Code	N (%) of Errors		
			Beginner	Intermediate	High-intermediate
MR	<i>Verbs</i>	VERB			
	Tense	VT	15 (5.3)	42 (9.7)	23 (5.1)
	Form	VF	31 (11.0)	21 (4.8)	27 (6.0)
	SV agreement.	SV	11 (3.9)	21 (4.8)	24 (5.3)
	Total Errors		57 (20.2)	84 (19.3)	74 (16.4)
	<i>Nouns</i>	NOUN			
	Articles/det.	ART	56 (19.9)	100 (23.0)	118 (26.1)
	Noun endings	NE	9 (3.2)	37 (8.5)	39 (8.6)
	Total Errors		65 (23.1)	137 (31.5)	157 (34.7)
	Total MT Errors		122 (43.3)	221 (50.9)	231 (51.1)
LX	Word choice	WC	62 (22.1)	81 (18.7)	103 (22.8)
	Word form	WF	36 (12.8)	63 (14.5)	50 (11.1)
	Informal usage	IU	3 (1.1)	0 (0.0)	0 (0.0)
	Idiom error	IE	1 (0.4)	3 (0.7)	0 (0.0)
	Pronoun error	PE	7 (2.5)	7 (1.6)	15 (3.3)
	Total LX Errors		109 (38.9)	154 (35.5)	168 (37.2)
SN	Sentence structure	SS	27 (9.6)	36 (8.3)	36 (8.0)
	Run-ons	RS	1 (0.4)	3 (0.7)	4 (0.9)
	Fragments	SF	22 (7.8)	20 (4.6)	13 (2.9)
	Total SN Errors		50 (17.8)	59 (13.6)	53 (11.8)
Total Number of Errors Marked			281 (100)	434 (100)	452 (100)

⁷ Two miscellaneous errors were not counted at this time.

2. Correlations between Error Ratio Measures and Error Types

To examine the relationships between errors per T-unit (E/T) and each error type, Spearman correlation tests were conducted. As shown in Tables 5 and 6, the results revealed correlations⁸ between an accuracy measure (E/T) and the three main types and their subtypes of errors based on writing scores. All three main types (MR, LX, SN) of errors and E/T show statistically significant differences across writing scores ($p < .01$). In Table 5, the morphological errors (MR) and E/T showed a strong correlation with writing scores ($r = .75$). Among morphological errors, errors related to verbs (VERB) showed a strong correlation with E/T ($r = .66$). All three subtypes of errors related to verbs (VT, VF, SV) revealed statistically significant difference with writing scores ($p < .01$). VF presented modest correlation ($r = .47$); however, VT and SV presented weak correlations with E/T. Another morphological type, errors related to noun (NOUN), showed statistically significant differences across writing scores ($p < .01$), and presented weak correlations with E/T ($r = .42$). Only one of the subtypes (ART) presented a weak correlation with E/T ($r = .37$).

TABLE 5
Correlations between E/T and Morphological Errors and Writing Scores

	MR	1.VERB	(1)VT	(2)VF	(3)SV	2.NOUN	(1)ART	(2)NE
E/T	.75**	.66**	.29**	.47**	.31**	.42**	.37**	.18

Spearman correlation. * $p < .05$, ** $p < .01$

MR (morphological errors): VERB (verbs); VT (tense), VF (form), SV (subject-verb agreement)/NOUN (nouns): ART (articles/determiners), NE (noun ending)

In Table 6, lexical errors (LX) presented high correlations with E/T ($r = .67$). WC ($r = .53$) and WF ($r = .45$) presented modest correlations with E/T. The remaining three subtypes of lexical errors (IU, IE, PE) neither showed statistically significant differences, nor revealed any correlation with E/T. The last type of error, syntactic errors (SN), revealed moderate correlation with E/T ($r = .53$). SS ($r = .39$) and SF ($r = .44$) showed weak correlations with E/T. As shown in Tables 6 and 7, errors that showed the highest correlation with E/T among three main error types were the morphological errors (MR, $r = .75$). Lexical errors (LX) also showed strong correlation ($r = .67$), and syntactic errors (SN) presented moderate correlation ($r = .53$) with E/T, based on students' writing scores.

⁸ Following Wolfe-Quintero et al. (1998), correlations are characterized as high ($r \geq .65$), moderate ($.45 \leq r < .65$), and weak ($.25 \leq r < .45$).

TABLE 6
Correlations between E/T and Lexical/Syntactic Errors and Writing Scores

	LX	1.WC	2.WF	3.IU	4.IE	5.PE	SN	1.SS	2.RS	3.SF
E/T	.67**	.53**	.45**	.16	.01	.17	.53**	.39**	.12	.44**

Spearman correlation. * $p < .05$, ** $p < .01$

LX (lexical errors): WC (word choice), WF (word form), IU (informal usage), IE (idiom), PE (pronoun); SN (syntactic errors): SS (sentence structure), RS (run-ons), SF (fragments)

3. Error Analysis by T-unit

To address the second research question presented in the study, the results of previous error analysis in Table 4 were recalculated with an accuracy measure. Through the results from Tables 5 and 6, correlations between the three main types of errors and E/T were clearly shown. These results made it possible to use T-units as a denominator for each value, so every error type was divided by T-unit values to standardize the results. In Tables 7 and 8, three main error types including each subtype error were calculated as the total number of error types per T-unit in three writing proficiency levels.

Table 7 illustrates the results between E/T and the three main types of errors across three writing proficiency levels. Table 8 indicates the results between each subtype of error in each main type and E/T. Tables 7 and 8 report the mean values (M) and standard deviations (SD) separately in each type of error, and show whether or not there exists evidence of significant differences across writing proficiency groups through the Kruskal-walis test, a one-way analysis of variance (ANOVA) post multiple comparison test.

As seen in Table 7, as writing proficiency levels increases, the mean values of errors tended to decrease ($p < .01$). E/T showed a similar pattern. Morphological errors (MR/T) indicated statistically significant difference ($p < .05$), and lexical errors' (LX/T) approached statistical significance ($p = .056$). The last type of error, syntactic errors (SY/T), showed the same pattern with E/T with statistically significant difference ($p < .01$). Table 8 provides a clearer picture of subtype errors.

TABLE 7
Comparison of Means (SD) of Three Main Error Types across Writing Proficiency Levels

Error Type	Code	Mean (SD)			Sig.
		Beginner	Intermediate	High-intermediate	
Morphological	MR/T	0.35 (0.20)	0.32 (0.16)	0.24 (0.13)	.03
Lexical	LX/T	0.30 (0.20)	0.24 (0.17)	0.18 (0.11)	.06
Syntactic	SN/T	0.14 (0.13)	0.09 (0.06)	0.05 (0.07)	< .01
Total errors	E/T	0.79 (0.32)	0.65 (0.28)	0.46 (0.22)	< .01

Kruskal-walis test was conducted. Data are expressed as mean (SD).

Table 8 describes group differences in subtypes of morphological, lexical, and syntactic errors across three writing proficiency groups. Among morphological errors (MR), errors related to verbs (VERB/T) including one subtype error (VF/T) showed statistically significant difference ($p < .05$). In case of VT/T and SV/T, mean values were the same in beginner and intermediate levels (VT/T: $M = 0.05$, SV/T: $M = 0.03$), and slightly decreased in high-intermediate level (VT/T: $M = 0.02$, SV/T: $M = 0.02$). However, VF/T showed slightly different patterns in which mean value ($M = 0.09$) in beginner level sharply declined in intermediate and high-intermediate levels ($M = 0.03$).

Conversely, errors related to nouns (NOUN/T) including two subtypes of errors (ART/T, NE/T) showed the highest error ratios in intermediate level, but did not show any significant difference among groups. Subtypes of errors related to nouns (NOUN/T) did not show statistical difference among groups.

In the case of lexical errors (LX), there was no subtype to show statistically significant difference. WC/T and WF/T seemed to decrease across writing proficiency levels, but did not show any statistical difference. The remaining three types of lexical errors (IU/T, IE/T, PE/T) provided very low frequency data, so results were not statistically reliable even though IU/T seemed to appear significantly different. All results supported previous results in Table 8 that lexical errors did not show differences among three groups. In other words, writing proficiency did not affect the error ratio from a lexical error perspective.

Regarding syntactic errors (SN), two out of three sub-types (SS/T, SF/T) of syntactical errors were statistically significant ($p < .05$), and revealed differences among groups. In the cases of SS/T and SF/T, beginner and intermediate levels were adjacent groups, and these groups showed higher error ratios than the high-intermediate level. From the results, students in the intermediate level tended to produce fewer sentence fragments (SF/T) and errors related to sentence structure (SS/T) than the students in the beginner level. In summary, four error types of errors (VERB/T, VF/T, SS/T, SF/T) except IU/T showed statistically significant difference, and showed differences among groups as well.

TABLE 8
Comparison of Means (SD) of Subtypes of Error across Writing Proficiency Levels

Error Type	Code	Mean (SD)			Sig.
		Beginner	Intermediate	High-intermediate	
<i>Verbs</i>	VERB/T	0.18 (0.15)	0.12 (0.08)	0.08 (0.08)	.02
Tense	VT/T	0.05 (0.07)	0.05 (0.08)	0.02 (0.04)	.32
Form	VF/T	0.09 (0.11)	0.03 (0.04)	0.03 (0.04)	.04
MR S-V agr.	SV/T	0.03 (0.05)	0.03 (0.05)	0.02 (0.03)	.85
<i>Nouns</i>	NOUN/T	0.18 (0.11)	0.20 (0.14)	0.16 (0.09)	.47
Art/det.	ART/T	0.14 (0.08)	0.15 (0.13)	0.12 (0.08)	.62
Noun endings	NE/T	0.04 (0.07)	0.05 (0.05)	0.04 (0.05)	.14

	Word choice	WC/T	0.18 (0.13)	0.13 (0.11)	0.10 (0.08)	.19
	Word form	WF/T	0.10 (0.09)	0.10 (0.13)	0.05 (0.07)	.07
LX	Informal usage	IU/T	0.01 (0.02)	0.00 (0.00)	0.00 (0.00)	< .01
	Idiom error	IE/T	0.00 (0.01)	0.00 (0.02)	0.00 (0.01)	.77
	Pronoun error	PE/T	0.02 (0.04)	0.01 (0.02)	0.02 (0.03)	.72
	Sen. structure	SS/T	0.08 (0.08)	0.05 (0.04)	0.03 (0.05)	.03
SN	Run-ons	RS/T	0.00 (0.02)	0.00 (0.02)	0.00 (0.01)	.93
	Fragments	SF/T	0.05 (0.09)	0.03 (0.03)	0.01 (0.02)	.04

Kruskal-walis test was conducted. Data are expressed as mean (SD).

4. Comparison of the Results from Two Error Analyses

To answer the third research question, all results from two error analyses were compared to examine how the different frames of error analyses affect the results.

Concerning the three main error types (MR, LX, SN) in comparison with two different sets of results, each error type tended to decrease across writing proficiency levels, and there was no difference in the ranking order (see Table 4 and 7). The results, ranked in descending order of frequency, were as follows: morphological, lexical, and syntactic errors. These results confirmed the ranking order of frequent errors that Korean university students have made in previous studies (K. A. Cha, 2004; J. Y. Kim, 1998).

The results of subtypes of errors compared with visual representations of the results of each error analysis in Figures 1 and 2. Figure 1 presented the results of error analysis, which are shown as a proportion of each error in Table 4. However, Figure 2 presents the results of error analysis shown by each value divided by T-unit in Table 8.

The comparison of subtypes of errors in Figures 1 and 2 showed different results. For instance, in the case of VT and WF, the beginner level showed fewer errors than the intermediate level in Figure 1. However, Figure 2 indicated opposite results, showing that there were more errors in the beginner level than the intermediate level. For instance, VF, SV, ART, NE, and WC showed opposite results. That is, errors in the high-intermediate level were higher than ones in the intermediate level in Figure 1; however, Figure 2 showed opposite results, as well.

With respect to each error type, some error types showed differing results through the two error analyses. For example, ART and WC were highest in the high-intermediate level in Figure 1, but were the lowest in Figure 2. Moreover, the gap between the beginner and intermediate levels regard to WC was widened shown to increase in Figure 2.

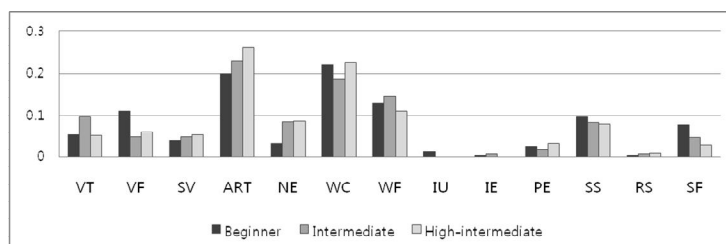


FIGURE 1 Group Means of the Total Error Rates by Percentages

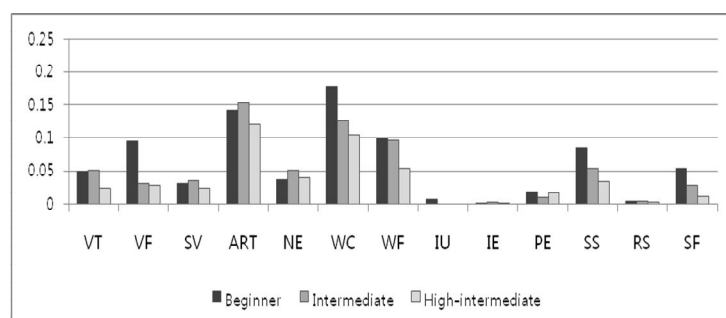


FIGURE 2 Group Means of the Total Error Rates by T-unit

In summary, all findings from the results show that error analysis with through an error ratio measure by using T-units might show yield more objective results than that with using the number of errors and the percentage of overall errors. A conventional error analysis by using the number of errors and its percentage has several weaknesses. First, when comparing other proficiency groups within the same participant pools, the results from two types of error analysis differ from the results shown in Figures 1 and 2. Next, the given results from the error distribution cannot be used for comparison with results of other studies because they are affected by the proficiency level of the participants. Finally, it is not easy to standardize the results of error distribution because these results are affected by the number of participants and their proficiency levels. For this reason, a new frame of error analysis that uses T-unit values as a denominator is needed when measuring language learners' errors.

However, explanations regarding why lexical errors become highly frequent error types across writing proficiency levels may be questionable. In comparison with Ferris' (2002) results, the lexical error ratio of Korean students in this study shows values two times higher than Ferris' study. An examination of the difficulty of vocabulary used in written productions may answer the question above. However, what this phenomenon seems to imply is that English education is still more focused on teaching grammar than vocabulary in most secondary schools in Korea. Strengthening lexical parts in English education concerning lexical aspects of the language should be strongly considered.

The results of current study also show that the L1 strongly influences Korean EFL learners' errors. Ferris (2002) claimed that types of errors students make could be influenced by their native languages. For instance, Japanese-speaking students have trouble with English articles, and Chinese-speaking students struggle with the English verb tense system. Similarly, Korean EFL learners have trouble with English articles, which are the most frequent errors because Korean is a language without an article system. In addition to L1 transfer effects, L2 acquisition order may play a role in forming linguistic errors.

V. CONCLUSION

The current study conducted error analysis of Korean EFL college learners' corpus using two different frames across three writing proficiency levels. The researcher analyzed language learners' written errors based on Ferris' (2002) error classification system, and presented the number of each error type and its percentage of overall errors. The researcher then recommended a new frame of error analysis using a new error ratio measure, in which the number of each error type is divided by T-unit values. Through examining the differences and similarities of results from two different frames of error analysis, the researcher concluded that error analysis with an error ratio measure (T-unit) brought out more comprehensive results by integration of the error analysis from sequence studies and the linguistic accuracy measures from index studies, and that these its result can be comparable to those from other studies.

Within the integrated frame, this study yielded several academic implications, which could contribute to L2 error analysis studies. First of all, most previous studies focused on only one type of study (sequence or index). Sequence studies indicate patterns of errors and frequency according to developmental linguistic features (K. A. Cha, 2004; Ferris, 2002; J. Y. Kim, 1998; J. Lee, 2009; C. Park, 2007). Index studies show results according to accuracy measures such as E/T or EFT/T, etc (Bardovi-Harlig & Bofman, 1989; Hirano, 1991; E. Hwang, 2012; Larsen-Freeman, 1975). However, the present study was conducted by integrating two areas of study, and made forced the researcher to examine the error analysis within two areas. Moreover, EFL Korean learners' common error types (e.g., articles/determiners, word choice) were found across all proficiency levels. These results support Ferris' (2002) claim that language learners' L2 proficiency levels, English language learning background, and native languages could affect their produced error types.

This study provides pedagogical implications for English teachers who are teaching writing and grammar in ESL/EFL contexts. ESL/EFL instructors should recognize that L2 learners have struggled with linguistic features, and with what kinds of linguistic errors L2 learners frequently make in connection with their English language proficiency levels.

When teaching English grammar, instructors could not focus on single grammar features, but on certain features that language learners had not yet acquired, and were essential in the next developmental stage of L2 acquisition. In the case of writing classes, the instructors could not provide comprehensive single error correction. They were able to focus on a certain linguistic features and errors frequently made by L2 writers in consideration of their proficiency levels: some linguistic features in the early stages of L2 language acquisition; other features which L2 writers have struggled with in the similar acquisition stages. In the case of the latter types of errors that could be directly corrected by their instructors because L2 learners do not have enough linguistic knowledge, students could not correct errors by themselves. They needed more linguistic input in these cases. In regards to the former types of errors, writing instructors were able to provide error feedback indirectly through underlining or check marks, asking students to work through those problems themselves.

This study, however, has several limitations. Using only female university students as subjects may overlook the effects of gender on written production. Moreover, the absence of an advanced group limits the reliable range of this study. In addition, some variables in the collected data did not show statistical normal distribution, so nonparametric methods were used. This makes it hard to use the multiple comparison tests to show the actual level difference between groups, even though some data indicate statistically significant differences. Lastly, there is no previous study that has the same research framework of integrating two types of error measures. Thus, all results and findings from this present study must be validated by further related studies.

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APPENDIX A
Summary of Error Types

Error Type	Explanation
Morphological Errors	
<i>Verbs</i>	
Tense	Missing/erroneous verb tense markers, includes modals when they clearly mark tense
Form	Verb phrases not specific to time/tense, includes ill-formed passives, conditionals, subjunctives, misuse of modals, infinitives, gerunds
Subject-verb agreement	An error in either noun/verb form leading to lack of agreement in
<i>Nouns</i>	
Articles/determiners	Unnecessary/missing/wrong article or determiner, or a determiner that does not agree in number with noun
Noun endings (plural/possessive)	Missing, unnecessary, or ill-formed plural or possessive markers
Lexical Errors	
Word choice	A wrong/unclear word, includes wrong verb, auxiliary, modal, preposition, or relative pronoun
Word form	All other non-verb related errors in which the wrong lexical category
Informal usage	Use of informal transitional expressions/other lexical choices reflecting an inappropriately casual register
Idiom error	Errors in the use of idiomatic expression
Pronoun error	Pronouns that do not agree in number/case with referent or that have no apparent antecedent
Syntactic Errors	
Sentence structure	Missing and unnecessary words, word order, and other hard-to-classify problems related to syntax
Run-ons	Run-on sentences, comma splices
Fragments	Either dependent clauses standing alone as sentences or clauses missing a subject/verb
Miscellaneous	

source from explanation of error types (Ferris, 2002, pp.113-116)

APPENDIX B

Sample of Writing

에세이 보기		에세이 기본 분석		에세이 구조 분석	
제목	Goals				
설명	Think about the goals you have for your future. Write an essay about what you will do to reach your goals, whether that is to be a professional athlete, a famous scientist or a happy Mom or Dad. Tell the story of how you will achieve your goals, being as specific as possible in describing the obstacles and challenges you might face on the road to success.				
작성일		평가일	2012-03-20 13:08:09		
점수	4/6 (Sufficient)	단어수	324		
평가내용	<p>Provides clear ideas, but sparsely developed; may have few details.</p> <p>Provides a clear sequence of information; provides pieces of information that are generally related to each other.</p> <p>Generally has simple sentences; may exhibit uneven control over sentence structure.</p> <p>Consists mainly of simple word choices, but may contain some specific word choices.</p> <p>Contains errors in grammar and conventions that generally do not interfere with understanding.</p>				
에세이	<p>Goal that I have for my future is becoming a great person. I know that the phrase 'a great person' could be abstract compared to other name of jobs. However, the reason that I mentioned the phrase is that I didn't choose my specific goals about my future career yet. Selecting a career for my entire life is not an easy thing to do. I have to be considerate and thoughtful. Nowadays, I am thinking about this for many times. This is a main thought I have in my mind.</p> <p>Even though I can not say the specific goals for my future, I have some specific modals about which I want to become. First of all, I want to be a person with a warm-hearted mind. A great person has a mind with kindness and consideration. I want to listen what other says and understand their mind. Secondly, I am going to connect my goals to my strength. Good things about myself compared to others are smily face and friendly personality. I want to make people bright with my bright smile. I strongly believe that the smile can change one's surroundings. Lastly, I hope to choose a carrer which has a relationship which other people. I like to meet new person and get to know about him/her. According to my wanting plan, I have to choose a goal which has a strong relationship with people and is fitable career that I can show my warm-hearted mind, smily face and friendly personality. While I am trying to become a person that I wanted, there will be many obstacles and challenges I might face on the road to success. Also, I might want to change my modals whenever I have a difficulty. However, I will try hard to be the great one. I will keep thinking about my future and choose the specific goals in this year. I am sure I can find the thing!</p>				

Examples in: English

Applicable Languages: English

Applicable Levels: Tertiary

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