

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

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This study makes an attempt to investigate the correlations between manifold aspects, namely both syntagmatic and paradigmatic relations, the four major derivative word forms, which represented morphological knowledge, six dimensions of analytic relations (i.e. component-integral, member-collection, portion-mass, stuff-object, feature-activity, and place-area) of vocabulary depth knowledge and academic reading comprehension among English as a Foreign Language learners at tertiary level. To this end, ninety one students from three departments of Business school and sixty four Engineering students (two departments) took part voluntarily in three depth of vocabulary knowledge tests and one reading comprehension test, which consisted of three reading passages with followed multiple choice questions. Results showed that firstly, analytic relations, which represented depth of vocabulary knowledge was positively and significantly correlated with reading comprehension. In other words, those students who gained more analytical relations (part-whole) knowledge performed better in reading comprehension than students with morphological knowledge and syntagmatic and paradigmatic relations, which represented depth of vocabulary knowledge. Secondly, students who had more paradigmatic (synonyms) relation knowledge performed better in reading comprehension than those who had syntagmatic relation (collocations), one of the two sub-tests of vocabulary depth knowledge test. Thirdly, the four major derivational word forms, i.e. noun, verb, adjective, and adverb were positively and either strongly or moderately correlated with dependent variable, academic reading comprehension. Fourthly, except one aspect of analytic relations, i.e. stuff-object analytic relations aspect, the rest of other five dimensions of analytic relations, namely component-integral, portion-mass, member-collection, place-area, and feature-activity analytic relations facets were positively and either strongly or moderately correlated with dependent variable, academic reading comprehension.

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1 Introduction

More than three decades ago, vocabulary was treated as a neglected dimension of language teaching and learning (Meara, 1980). Recently, it has plausibly become one of the most substantial research niches in second language (L2) acquisition, assessment and instruction (Schmitt, 2010). Up till now, researches on L2 vocabulary knowledge have evidenced a clear polarity regarding its multidimensionality (Zhang & Yang, 2016). For example, vocabulary researchers have mainly focused on the significant part played by vocabulary breadth or size (i.e. how many words one knows) on reading success (Jeon & Yamashita, 2014; Laufer, 1992, 1996; Milton, 2013; Na & Nation, 1985; Nation, 1990, 2001; Read, 2000). Nevertheless, far less about different dimensions of depth of vocabulary knowledge (i.e. vocabulary knowledge that pertains to the quality of words) have been investigated by researchers (Schmitt, 2014). Qian (2002) argues that both breadth and depth dimensions deserve equal attention for investigating the significant part vocabulary knowledge plays in reading comprehension. Contemporary researchers that encompassed depth of vocabulary knowledge put stress on mainly paradigmatic (synonymy and polysemy) and syntagmatic (collocation) relations of vocabulary depth knowledge and their relationship with reading comprehension in English as a Second Language (ESL)/English as a Foreign Language (EFL) contexts (Li & Kirby, 2015; Qian, 1999, 2000, 2002; Read, 1993, 1998; Zhang, 2012).

Hasan and Shabdin (2016) provided rationales to encompass different dimensions of depth of vocabulary knowledge, namely paradigmatic relation (synonyms, hyponymy, antonymy), syntagmatic relation (collocation), analytic relations (meronymy) and morphological knowledge (affixes) as integral parts of depth of vocabulary knowledge to examine their correlation with academic reading comprehension. To the best knowledge of the researchers of this paper, there is considerable lack of empirical research which dealt with the relationship of the said different dimensions as indispensable parts of vocabulary depth knowledge with reading comprehension.

Moreover, against a backdrop of English language proficiency of Bangladeshi English as a Foreign Language (EFL) learners, it is observed that in spite of the importance on English given for the last few decades by the government of Bangladesh, studies portray poor English achievement of Bangladeshi learners (Hamid, 2011). The deterioration in national proficiency levels of English affects the standards (the quality of education in comparison with the bench mark set by the British regime before the independence of Bangladesh) of education in Bangladesh as well as the functioning of government bureaucracy (Hamid, 2011), and also because of the demand of

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

globalization, the government of Bangladesh realizes the need to revive the learning and the teaching of English in educational sector.

University students in Bangladesh receive twelve years of formal English training in their high schools and colleges, and they are expected to have ability to read and comprehend English text books under their course of study without much difficulty. Regrettably, many of the students at tertiary level in Bangladesh find great difficulty comprehending English text books related to their field of study (Sultana, 2014). The major reason for students' facing great difficulty reading English text books is their lack of adequate vocabulary knowledge (Jahan & Jahan 2011), and the same reason can be observed in other studies as well. The difficulties in comprehending English text books faced by Taiwanese college students are caused by their lack of adequate vocabulary knowledge (Ma & Lin, 2015). The inadequacy of vocabulary knowledge of the Taiwanese college students is evidenced in many other studies (e.g. Chen, 1999; Cheng, 2007; Huang, 1997).

Regrettably, the lack of vocabulary knowledge in English of the students at tertiary level in Bangladesh negatively affects the academic performance of the students, and the students fail to achieve the desired result (CGPA) in their higher studies (Jahan & Jahan, 2011). It becomes obvious that students at tertiary level do not possess the required vocabulary knowledge in English to overcome the difficulties and to become successful graduates.

Vocabulary knowledge in English exerted significant effects on academic reading skill, and students without sufficient knowledge of vocabulary in English were not able to comprehend completely the reading texts in English (Arju, 2011). In other words, the comprehension ability in English of the learners depends on their vocabulary knowledge. The possession of rich knowledge of vocabulary works as an important factor in the pursuit of mastering a foreign language (FL) or L2 language (Horwitz, 1988; Jahan & Jahan, 2011). The more the EFL learners possess vocabulary knowledge, the better they are able to handle the language skills of English, particularly reading skill (Arju, 2011). Undoubtedly, the investigation of vocabulary knowledge of the students in EFL contexts like Bangladesh becomes important, and by addressing the vocabulary problem of the students, this study aims to provide insights into the ways of getting students' academic success at tertiary level in Bangladesh.

Little is known about the combined morphological (derivative forms of words) knowledge and analytic relations (part-whole) aligned with syntagmatic and paradigmatic relations and their association with scores of academic reading comprehension, even in the context of Bangladesh. This study has been designed while taking the above issue into consideration. To this end, employing an adapted vocabulary depth knowledge test, an adapted morphological knowledge test, and an adapted analytic relations test, this study investigated Bangladeshi EFL learners' depth of vocabulary knowledge and its relation with their academic reading comprehension.

2 Literature Review

2.1 The definition of vocabulary knowledge

Researchers (e.g. Chapelle, 1998; Henriksen, 1999; Nation, 1990, 2001; Qian, 1988, 1999, 2002; Read, 1989, 1993, 1998, 2000; Richards, 1976; Wesche & Paribakht, 1996) who deal with L2 vocabulary do not reckon the knowledge of vocabulary having only one particular aspect, but they view that vocabulary knowledge has manifold dimensions. Qian (1999), Read (1989), and Wesche and Paribakht (1996) affirm that the knowledge of vocabulary needs to encompass minimally two features, i.e. breadth or size of vocabulary, and quality or depth knowledge regarding vocabulary. The size or breadth of vocabulary refers to the number of words a learner knows, i.e. the learner needs to possess minimal knowledge of the meaning of the words whereas vocabulary depth knowledge denotes the degree a learner has knowledge of a word (Qian & Schedl, 2004; Qian, 2005). The facet of vocabulary depth knowledge includes different elements, such as, spelling, pronunciation, meaning, frequency, register, and syntactic, morphological traits (Qian, 1998, 1999).

2.2 Paradigmatic, syntagmatic and analytic relations

Read (2004) distinguished that three fundamental associations existed between target words and associates, and they were syntagmatic (collocations), paradigmatic (synonyms, superordinates) and analytic (vocabulary items that represented a vital component regarding the denotation of the target word). An example can be given to illustrate the point.

contract					
agreement	confident	formal	notice	sign	special

(Source: Read, 2004: 221)

The appropriate answers for the above example are ‘agreement’ (shows paradigmatic relation), ‘sign’ (shows syntagmatic relation), and ‘formal’ (shows analytic relations).

2.3 Vocabulary depth and reading comprehension

As previously mentioned that vocabulary researchers have mainly focused on the significant role played by vocabulary breadth or size on reading comprehension (i.e. Jeon & Yamashita, 2014; Laufer, 1992, 1996; Milton, 2013; Na & Nation, 1985), and less investigation on how depth of vocabulary knowledge contributes to reading success has been conducted (Jeon & Yamashita, 2014). Qian (1999) in his study of ESL learners in Canadian universities found that learners’ vocabulary depth knowledge explained about 11% extra variance in their reading success. His study suggested that

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

vocabulary depth knowledge tended to be more significant predictor to reading comprehension than vocabulary size. Several studies (Choi, 2013; Kang, Kang, & Park, 2012; Kezen, 2015; Weixia, 2014) showcased significant, positive, and moderate correlations between depth of vocabulary knowledge and reading comprehension. The above studies that dealt with the association between reading comprehension and vocabulary depth knowledge only included paradigmatic relation (synonyms, antonymy, and superordinate under hyponymy), syntagmatic relation (collocations) as a part of vocabulary depth knowledge, but other aspects, like morphological knowledge and analytic (part-whole) relations as integral parts of vocabulary depth knowledge and their association with reading comprehension had not been explored.

2.4 The rationale for choosing morphological knowledge and analytic relations in the study

The measures that examine different parts of vocabulary depth knowledge in English made greater and more powerful influence over reading success in comparison with the measures which solely tested only one terming of an utterance (Nassaji, 2004). According to Vermeer (2001), there was not much investigation conducted by the lexical researchers on the association among different dimensions of the knowledge of vocabulary. Even though other aspects of morphological properties, such as spelling, pronunciation, parts of speech and register are not negligible parts of depth of vocabulary knowledge (Weixia, 2014), the present study takes one aspect of morphological knowledge (derivative forms of words) as an essential part of depth of vocabulary knowledge. Morphological knowledge is an important aspect of vocabulary depth as Li and Kirby (2015) argued that the knowledge of root and affixes could help learners comprehend the formation of words which in turn would develop the learners' understanding of the relationships among words.

The assertion of Li and Kirby (2015) was that only as single vocabulary depth measure could not encompass the whole gamut of the construct; as a result, an examination of the whole set of tests that include entire aspects of vocabulary depth knowledge is needed. For example, other aspects of vocabulary depth knowledge, like morphosyntactic needs to be explored for getting complete understanding about depth of vocabulary knowledge (Ma & Lin, 2015).

Analytic relations is known as important type of semantic relation (Winston, Chaffin, & Hermann, 1987). Schmitt and Meara (1997) also claimed the importance of word association knowledge in the field of language learning; consequently, analytic (part-whole) relations can be considered as one of the significant facets of vocabulary depth knowledge. Recent studies (e.g. Atai & Nikuinezad, 2012; Chen, 2011; Choi, 2013; Farvardin & Koosha, 2011; Kameli, Mustapha & Alyami, 2013; Kezhen, 2015; Li & Kirby, 2015; Mehrpour, Razmjoo & Kian, 2011; Moinzadeh & Moslehpour, 2012; Rashidi &

Khosravi, 2010; Rouhi & Negari, 2013) that dealt with the association between reading comprehension and vocabulary depth knowledge had only included paradigmatic relation (synonyms, antonymy, and superordinate under hyponymy), syntagmatic relation (collocations) as a part of vocabulary depth knowledge, but other aspects, like morphological knowledge and analytic relations as a part of vocabulary depth knowledge and their association and prediction to reading comprehension had not been explored.

To the best knowledge of the authors, there has been lack of empirical investigation which combines three components, namely analytic (part-whole) relations, syntagmatic and paradigmatic relations, which represented vocabulary depth test, and morphological knowledge all together as a part of vocabulary depth knowledge in a single study and examines the prediction of all three constituents of vocabulary depth knowledge to academic reading comprehension; as a result, considering a study along the line mentioned needs to be investigated (Ma & Lin, 2015). To address the research gaps in the previous studies and based on the consideration in literature review, the following research questions were formulated:

1. To what extent do scores of three aspects (i.e. syntagmatic and paradigmatic relations, morphological knowledge, and analytic relations) of vocabulary depth knowledge correlate with each other and with academic reading comprehension?
2. To what extent are syntagmatic and paradigmatic relations, which represented vocabulary depth knowledge related to each other and with academic reading comprehension?
3. To what extent are four major derivative classes of morphological knowledge, which represented vocabulary depth knowledge correlated with each other and with academic reading comprehension?
4. To what extent do component-integral, member-collection, portion-mass, stuff-object, feature-activity, and place-area analytic relation dimensions, which represented depth of vocabulary knowledge correlate with each other and with academic reading comprehension?

3 Methodology

3.1 Participants

Participants in the study were a sample of 155 Bangladeshi EFL students (five sections) in the first year of their graduation from a mid-level private university in Dhaka, Bangladesh. A total of 91 participants from three sections of Business school, namely Bachelor of Business Administration in Finance or in other majors ($n = 36$) and Bachelor of Science in Economics ($n = 25$) and Bachelor of Business Administration in Accounting ($n = 30$) was included in the present

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

study. Out of them, 51 were female (56%) and 40 were male (44.0%), with an average age of about 20.54 (SD=1.241, range 18-24). Moreover, a total of 64 students, studying Engineering participated in the current study. Out of them, 20 were female (31.3%) and 44 were male (68.8%), with an average age of about 20.16 (SD=1.027, range 18-23). One section consisted of 31 students who were pursuing studies in Bachelor of Science in Electrical and Electronic Engineering, and the other section comprised 33 students who were under department of Computer Science & Engineering. All the students were selected based on their passing Basic English Skill (Credit course 1) course which was approximately at A2-B1 level on the Common European Framework of Reference. Bengali was the mother tongue of students of both Business and Engineering schools. The students of the study used English as a foreign language. The participants of the study had at least 12 years of learning English from class one to class twelve since English is taught as a compulsory subject from class one to twelve in government, semi-government or English as a medium of instruction schools (I-V), high schools (VI-X) or colleges (XI-XII) in Bangladesh. From the background information in the questionnaires, it was known that all the students were from government or semi-government run schools or colleges, so it can be inferred that the participants of the present research study had at least an average of 12 years exposure to English learning. In addition, they had no experience of staying in any native English-speaking country.

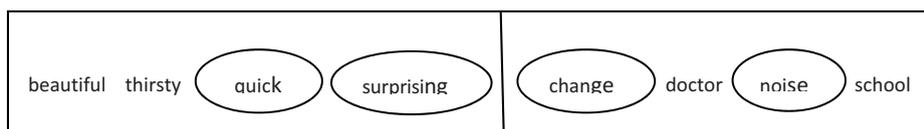
3.2 Measures

Three vocabulary knowledge tests and one reading comprehension test were employed in the present study. In addition, one morphological knowledge test consisted of the four major derivative word classes and one academic reading comprehension test, comprised three multiple-choice passages were employed in the present study.

3.2.1 Depth of vocabulary knowledge test

Depth of vocabulary knowledge test (an independent variable of the study) which was administered for the current study was partly the version of Word Associates Test (WAT, Read, 2004). In other words, version 4 of the WAT and depth of vocabulary test used by Qian and Schedl (2004) were adapted and employed in order to assess the depth of vocabulary knowledge of the current study. WAT was considered as a reliable test to assess several paradigmatic and syntagmatic characteristics of vocabulary knowledge (Qian, 2000). The depth of vocabulary knowledge test of the present study comprised 40 items, and it proposed to evaluate two constituents of vocabulary depth knowledge; they were paradigmatic (meaning/synonyms) and syntagmatic (collocation) relations of words. Under each item (i.e., target word), there were eight options, and each item had two groups with equal number of associates and distractors. In other words, the left-hand side, i.e., one group was for checking the understanding of

paradigmatic relation, and the right-hand side group, i.e., another group was for checking the understanding of syntagmatic relation of the target words. Each different column had four words, and out of the eight words, four words were associates to the stimulus words whereas the other four words worked as distractors. An incorrect selection of the answer was given 0; as a result, the maximum achievable score of the vocabulary depth knowledge was $4 \times 40 = 160$. A sample of the test item is given in the following:



3.2.2 Analytic relations test

Analytic relations (an independent variable of the study) test for the current study was adapted on the basis of the idea about part-whole relations propagated by Winston, Chaffin and Herrmann (1987), and the aim of the test was to measure to the part-whole relations of words. Analytic relations test of the current study comprised 30 items, and it proposed to evaluate part-whole constituents of vocabulary depth; under each item (target word), there were two groups with equal number of associates and distractors, and each group contained words that connote different types of part-whole relations. Each different column had four words, and out of the eight words, four words were associates to the stimulus words whereas the other four words worked as distractors. An incorrect selection of the answer was given 0; four correct answers of each item constituted 1 point ($0.25 \times 4 = 1$); as a result, the maximum achievable score of analytic relations test was $1 \times 30 = 30$. Six types of meronymic relations were investigated under analytic relations tests of the current study. The example of the first one, 'component-integral object' related 'handle-cup' or 'punchline-joke' type of analytic relation; secondly, 'tree-forest' or 'card- deck' can be an example of 'member-collection' analytic relation. The third category of analytic relation encompassed 'portion-mass', and 'slice-pie' or 'grain-salt' is an example of 'portion-mass' category of analytic relation. An example like 'gin-martini' or 'steel-bike' was classified under 'stuff-object' analytic relation. The fifth category, 'feature-activity' of analytic relation incorporated examples like 'paying-shopping' or 'dating-adolescence'. The last and the sixth category of analytic relation was categorized as 'place-area', and 'oasis-desert' or "Everglades-Florida" is an example of 'place-area' type of analytic relation. Out of 30 items, items from 1 to 13 consisted of 'component-integral' analytic relations part of depth of vocabulary knowledge, items of 14 and 15 represented 'member-collection' analytic relations part, items number 16 and 17 indicated 'portion-mass' analytic relations dimension, items from 18 to 24 showcased 'stuff-object' analytic relations dimension, items of 25, 26 and 27

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

demonstrated ‘feature-activity’ analytic relations facet, and items from 28 to 30 referred to ‘place-area’ analytic relations aspect of depth of vocabulary knowledge. An example of the employed test item is given in the following:

Car

(A) wheels	(B) mirrors	(C) mud	(D) engine	(E) solid	(F) temperature	(G) brakes	(H) dance
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3.2.3. Morphological knowledge test

Morphological knowledge (an independent variable of the study) test of the present study was executed for checking learners’ productive knowledge of the four major derivative forms of a word family (i.e. noun, verb, adjective and adverb). Students were asked to jot down the correct derivative forms of the target word in the provided blanks. If learners believed that no derivative form existed, they simply placed an X in the blank. For the current study, the morphological knowledge test was adapted on the basis of the test deigned by Schmitt and Zimmerman (2002). In scoring for the morphological knowledge test, one point was awarded to learners for their correct answer. An incorrect answer provided 0 point. The test had 30 blanks, so the maximum possible score for the test was 30. An example of the test item is given below:

stimulate		
<u>stimulation</u>	Noun:	A massage is good _____
<u>stimulate</u>	Verb:	Massages can _____ tired muscle.
<u>stimulating</u>	Adjective:	A massage has a _____ effect.
<u> X </u>	Adverb:	He massaged _____ .

3.2.4 Reading comprehension test

Reading comprehension (a dependent variable of the study) test of the study was a standard multiple-choice academic reading comprehension test, and the test was adopted from Longman Test of English as a Foreign Language (TOEFL) (Philips, 2006, pp. 343-345). Out of several passages, three texts were selected for the current study, and the total number of multiple-choice questions was 20. The maximum possible score for the test was 20 as there was a total of 20 questions. The rationale for choosing TOEFL reading comprehension test for the current study was purely for its validity and reliability check. It is known to the researchers that “as an established standardized language test, all of the official TOEFL tests have been carefully pretested for validity and reliability before being put into actual use” (Qian, 1998, p. 55). The original reading comprehension test that was taken from TOEFL by Philips (2006) consisted of five sections, and time allocated for completing the reading comprehension test was 55 minutes. In order to administer all the tests for the present study, constraints of time were anticipated, so there was a need to shorten the original

reading comprehension test. Consequently, two passages were taken out randomly. An example of a reading comprehension test item is provided in the following:

You are to choose the one best answer, (A), (B), (C), or (D), by ticking (✓) to each question.

In line 4, the word “unswerving” (bold) is closest in meaning to--- (A) moveable (B) insignificant (C) unchanging (D) diplomatic.

3.3 Research design and data collection procedures

The current study followed quantitative approach, and correlation design was used to describe the potential associations among the variables. Purposive sampling and random sampling as second step were employed for the present study. In order to find out the level of intercorrelations among the sub-components of all three aspects of vocabulary depth knowledge and reading comprehension, a two-tailed Pearson correlation was selected as the key instrument for analysing the data. SPSS version 24 (Statistical Package for Social Studies) was exercised as the key statistical program for analysing the data.

3.4 Validity of the instruments of the study

Kuder-Richardson Formula 20 or K-R-20 is used for measuring reliability of a test which consists of right or wrong answers, and it is designed to investigate how well a test measures that a researcher intends to measure (Alderson, Clapham, & Wall, 1995). Considering K-R 21 as a method of rational equivalence for checking out internal consistency (Alderson, Clapham, & Wall, 1995) of the tests, K-R 21 was employed to compute their reliability coefficients. The computing of K-R 21 was performed, following the formula which is $[n/(n-1) * [1-(M*(n-M)/(n*Var))]]$ where ‘n’ stands for ‘sample size’; ‘Var’ stands for ‘variance for the test’, and ‘M’ stands for ‘mean score for the test’. The following table 1 shows the reliability coefficients of the four tests that were conducted to find out their validity and reliability.

Table 1. Means, Standard Deviations and Reliability Coefficients Value

Tests	n*	Range	Minimum	Maximum	Mean	Std. Deviation	K-R Reliability Coefficients	MPS**
DVK ¹	40	22.00	137.00	159.00	147.80	6.677	0.750	160
MKT ²	30	14.00	12.00	26.00	19.15	3.717	0.516	30
AR ³	30	14.00	15.00	29.00	22.90	3.726	0.631	30
RC ⁴	20	10.00	8.00	18.00	12.85	3.281	0.630	20

** MPS= maximum possible score * n = number of items

DVK¹= Depth of Vocabulary Knowledge; MKT²= Morphological Knowledge Test; AR³= Analytic Relations; RC⁴= Reading Comprehension

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

The r values (reliability coefficients) of the four tests, namely vocabulary depth, morphological knowledge, analytic relations, and reading comprehension were moderate even though the r value (0.516) of morphological knowledge was the lowest in comparison with r values of other tests. In spite of that, the score of morphological knowledge can be considered to have accepted level of reliability since the number of items (20) was small. Importantly, the acceptable K-R-21 score is dependent on the type of conducted test. Generally, a score, that is, above 0.05 is regarded as reasonable. According to Salvucci, Walter, Conley, Fink, and Saba (1997:115), in terms of the range of reliability measure, when the r value is less than 0.50, the reliability is considered low; if the r value is between 0.50 and 0.80, the reliability is regarded as moderate whereas the r value is greater than 0.80, the reliability is treated as high. Even though K-R 21 employs less information to compute, it always provides a lower reliability index than produced by other methods (Alderson, Clapham, & Wall, 1995).

4 Results and Discussion

4.1 Correlations among paradigmatic and syntagmatic relations, morphological knowledge, analytic relations and academic reading comprehension

To answer research question 1, i.e. regarding the strength and direction of correlations of three dimensions of vocabulary depth knowledge and academic reading comprehension, a two-tailed Pearson correlation was conducted, and results are presented in Table 2.

Table 2. Correlations among Three Components of Vocabulary Depth Knowledge and Academic Reading Comprehension

	DVK ¹	MKT ²	AR ³
MKT	0.414**	----	
AR	0.299**	0.435**	---
RC ⁴	0.351**	0.385**	0.509**

** Correlation is significant at the 0.01 level (2-tailed). ¹ Depth of Vocabulary Knowledge Test, ² Morphological Knowledge Test, ³ Analytic Relations, and ⁴ Reading Comprehension

As shown in the table 2, inter-correlations among the scores of three independent variables, vocabulary depth knowledge test (represented by both paradigmatic and syntagmatic relations), morphological knowledge (the four major derivative classes, i.e. noun, verb, adjective, and adverb), and analytic relations (six components, i.e. component-integral, member-collection, portion-mass, stuff-object, feature-activity and place-area) were all statistically significant. A significant and positive correlation at the 0.01 level ($r = .414$; $p = .001$) was found between vocabulary depth knowledge test and morphological knowledge. According to Cohen (1988, p. 80), in behavioural sciences, a

correlation of r about 0.50 or above generally indicates a ‘large correlation effect size’, and he also suggests that when the coefficient value r is between ± 0.30 and ± 0.49 , the relationship is considered as medium, and when r coefficient value is between ± 0.1 and ± 0.29 , the association is said to be as small. The correlation between vocabulary depth knowledge test and morphological knowledge suggests that students who learned both paradigmatic and syntagmatic relations also mastered the four derivative forms of morphological knowledge, which represented vocabulary depth knowledge. Also, a significant and positive correlation at the 0.01 level ($r = .299$; $p = .000$) was found between vocabulary depth knowledge test and analytic relations. This shows that students who learned both paradigmatic and syntagmatic relationship knowledge also mastered six dimensions of analytic relations, which represented vocabulary depth knowledge.

The same can be observed regarding correlation between morphological knowledge and analytic relations. A significant and positive correlation at the 0.01 level ($r = .435$; $p = .000$) existed between morphological knowledge and analytic relations. This indicates that students who learned the four major derivative word classes also mastered six features of analytic relations. Out of the inter-correlations among the three components of vocabulary depth knowledge, the significant correlation between morphological knowledge and analytic relations of vocabulary depth knowledge was the highest ($r = .435$). In the light of the above discussion, the significant and positive correlations among three independent variables have been provided in Figure 1.

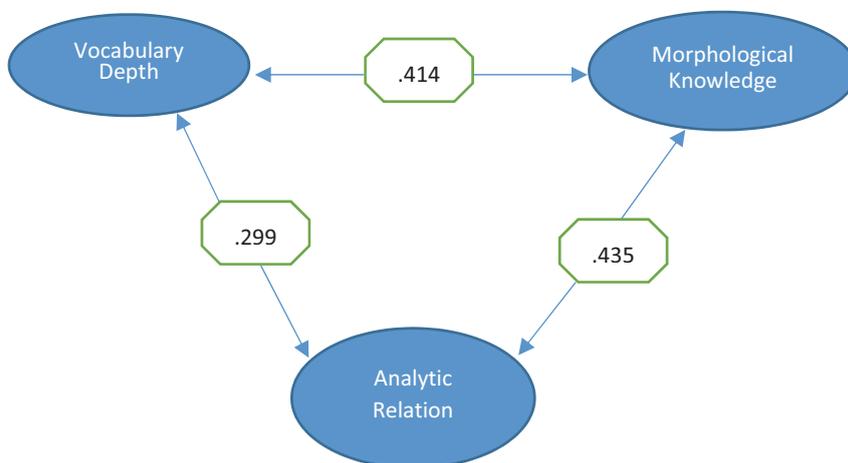


Figure 1. Correlations among three independent variables

As shown in Table 2, a statistically significant and positive correlation at the level of 0.01 ($r = .351$; $p = .000$) was found between both syntagmatic and paradigmatic relations, which represented vocabulary depth knowledge

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

(test) and academic reading comprehension. Moreover, the four derivative word forms, which represented morphological knowledge of depth of vocabulary knowledge bore positive and statistically significant correlation at the level of 0.01 ($r = .385$; $p = .000$) with academic reading comprehension. The significant and positive, high correlation at the level of 0.01 ($r = .509$; $p = .000$) between six dimensions of analytic relations, which represented vocabulary depth knowledge and academic reading comprehension was the highest in comparison with associations between other two independent variables and academic reading skill. This signifies that students who had knowledge about component-integral, member-collection, portion-mass, stuff-object, feature-activity, and place-area analytic relation parts of vocabulary depth knowledge performed better in academic reading comprehension than students with knowledge of syntagmatic and paradigmatic relations and the four derivative word forms of vocabulary depth knowledge. To conclude, in other words, all three components of vocabulary depth knowledge helped learners perform better in academic reading comprehension. The inter-correlations between three independent variables and academic reading comprehension are presented in figure 2.

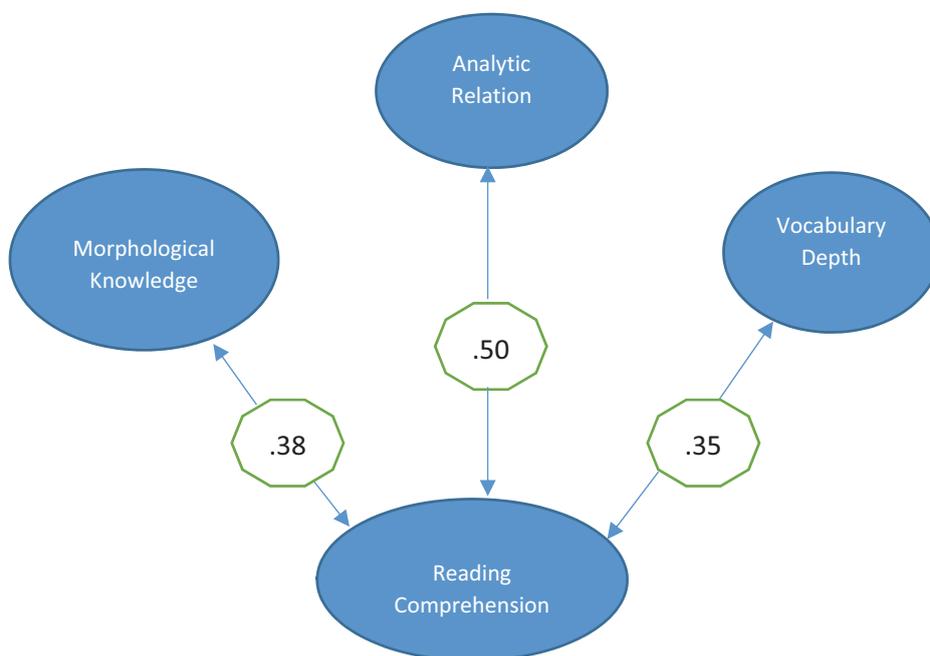


Figure 2. Correlations among three independent variables and reading comprehension

Thus, an examination of the relationship between three dimensions of vocabulary depth knowledge and academic reading comprehension at this stage

among graduate students at tertiary level in Bangladesh has answered the first research question. However, the current study conducted an additional Pearson correlation analysis which was directed to investigate the inter-sub-relationships between syntagmatic and paradigmatic relations, which represented vocabulary depth knowledge test and academic reading comprehension, between the four derivative word forms (i.e. noun, verb, adjective, and adverb), which represented morphological knowledge of depth of vocabulary knowledge and academic reading comprehension, and between six dimensions of analytic relations of vocabulary depth knowledge and academic reading comprehension. The intended merit of this extra correlation analysis was to broaden the horizon of knowledge and to receive deeper grasp of the inter-correlations and to find out the determining nature of the associations that existed among two aspects, syntagmatic and paradigmatic relations of vocabulary depth knowledge test, the four major derivative word forms, which represented morphological knowledge of vocabulary depth knowledge, and six dimensions of analytic relations, which represented vocabulary depth knowledge and dependent variable, academic reading comprehension. The following sub-sections analyse the sub-relationships of all three aspects of vocabulary depth knowledge and academic reading comprehension. Table 3 presents the sub-relationships between both syntagmatic and paradigmatic relations and academic reading comprehension.

4.2 Correlations among paradigmatic relation, syntagmatic relation and academic reading comprehension

Research question 2 refers: “To what extent are syntagmatic and paradigmatic relations, which represented vocabulary depth knowledge related to each other and with academic reading comprehension?” The following Table 3 presents the correlations among paradigmatic (synonyms) relation, syntagmatic (collocations) relation, and academic reading comprehension.

Table 3. Correlations among Paradigmatic Relation, Syntagmatic Relation, and Academic Reading Comprehension

	Paradigmatic (Synonyms)		Syntagmatic (Collocations)
Syntagmatic (Collocations)	Pearson Correlation	0.445**	
	Sig. (2-tailed)	0.000	-----
Reading Comprehension	Pearson Correlation	0.324**	0.269**
	Sig. (2-tailed)	0.000	0.001

** . Correlation is significant at the 0.01 level (2-tailed)

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

The above Table 3 shows that there was significant, positive correlation at the 0.01 level ($r = .324$; $p < .01$) between academic reading comprehension and paradigmatic (synonymous words) relation, which represented vocabulary depth knowledge test, and this suggests that students who had more paradigmatic (synonyms) relation knowledge performed better in academic reading comprehension than those who had syntagmatic relation (collocations) which had positive and significant correlation at the 0.01 level ($r = 0.269$; $p < .01$) with reading comprehension. This signifies that students who had knowledge about both paradigmatic (synonyms) and syntagmatic (collocations) relations, which represented vocabulary depth knowledge (test) performed well in academic reading comprehension. In other words, two aspects of vocabulary depth knowledge helped learners perform well in academic reading comprehension. On the other hand, as shown in Table 3, correlation at the 0.01 level ($r = .445$; $p = .000$) between paradigmatic and syntagmatic relations of vocabulary depth knowledge test was found positive and statistically significant. Moreover, it gives the idea that the two aspects, syntagmatic and paradigmatic relations are interconnected, and they necessarily form essential components of vocabulary depth knowledge.

4.3 Correlations among the four major derivative word classes with each other and academic reading comprehension

Research question 3 alludes: “To what extent are the four major derivative classes of morphological knowledge, which represented vocabulary depth knowledge correlated with each other and with academic reading comprehension?” Table 4 showcases inter-correlations among the four major derivative word forms and academic reading comprehension.

Table 4. Correlations among the Four Major Derivative Word Classes with Each Other and Academic Reading Comprehension

	Noun	Verb	Adjective	Adverb
Verb	0.365**	----		
Adjective	0.344**	0.369**	---	
Adverb	0.271**	0.389**	0.391**	---
RC	0.178*	0.339**	0.284**	0.299**

**Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 4, inter-correlations among the scores of four independent variables were all statistically significant. A significant and positive correlation at the 0.01 level ($r = .365$; $p = .000$) was found between noun and verb derivative forms. This suggests that students who learned noun word derivative form also mastered verb word class. Also, a significant and positive correlation at the 0.01 level ($r = .344$; $p = .000$) was found between noun word class and adjective word class of vocabulary depth knowledge. This shows that students who learned noun word class also mastered adjective word

form. The same can be observed regarding correlation between noun word class and adverbial word form. A very significant and positive correlation at the 0.01 level ($r = .271$; $p = .001$) existed between noun derivative form and adverbial word class. This indicates that students who learned noun word class also mastered adverbial word class of vocabulary depth knowledge.

Moreover, verb word class correlated at the 0.01 level ($r = .369$; $p = .000$) positively and significantly with adjective word class. This indicates that the growth of students' learning of verb word class was positively proportionate to students' learning adjective word class. In addition, verb word class held significant, positive correlation at the 0.01 level ($r = .389$; $p = .000$) with adverbial derivative word form. This suggests that the growth of students' learning verbal word class was positively proportionate to students' learning adverb word class.

As shown in Table 4, correlation at the 0.01 level ($r = .391$; $p = .000$) between adjectival word class and adverbial word class was found positive and statistically significant. This evinces that students who learned adjectival word class also mastered adverbial word class of morphological knowledge. Out of the inter-correlations among the four major derivative classes, the significant correlation between adjectival and adverbial word class of vocabulary knowledge was the highest ($r = 0.391$). In the light of the above discussion, the significant and positive correlations among the four derivative word forms have been provided in the figure 3.

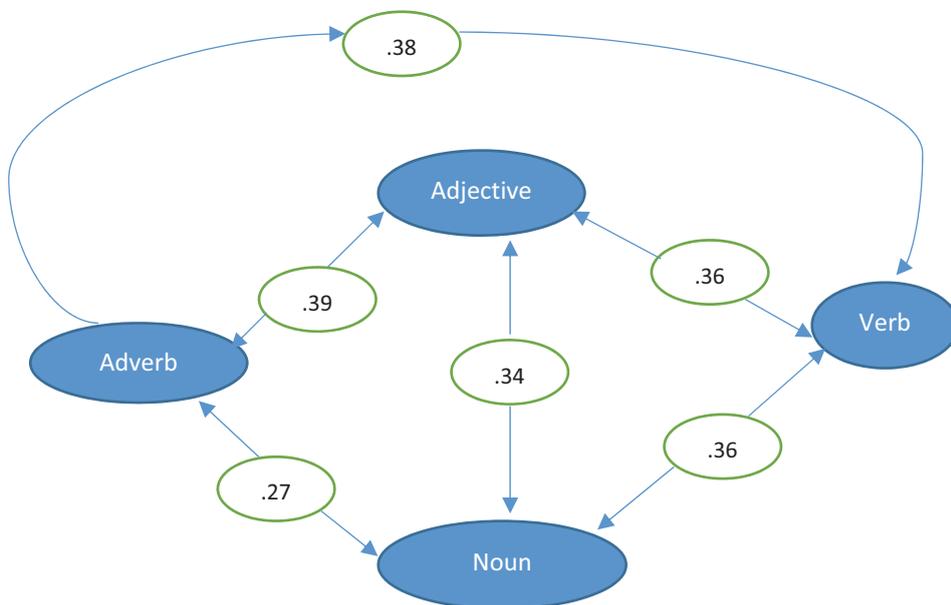


Figure 3. Correlations among the four derivative word forms

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

As presented in Table 4, the inter-correlations between the four major derivative classes and academic reading comprehension were found positive and statistically significant. A statistically significant and positive correlation at the level 0.01 ($r = .178$; $p = .032$) was found between noun word class and academic reading comprehension. Moreover, verb word class bore positive and statistically significant correlation at the level of 0.01 ($r = .339$; $p = .000$) with academic reading comprehension. The correlation between verb word class and academic reading comprehension was the highest in comparison with associations between other derivative word forms and academic reading skill. The inter-correlations between scores of other two independent variables, adjectival word class ($r = 0.284$; $p = 0.001$), adverbial word class ($r = .299$; $p = .000$) and dependent variable, academic reading comprehension were positive at the level of 0.01. This signifies that students who had knowledge about noun, verb, adjective and adverbial word class of vocabulary knowledge performed better in academic reading comprehension. In other words, all the four derivative classes of vocabulary knowledge helped learners perform better in academic reading comprehension.

4.4 Correlations among six components of analytic relations with each other and academic reading comprehension

Research Question 4 relates: “To what extent do component-integral, member-collection, portion-mass, stuff-object, feature-activity, and place-area analytic relations dimensions, which represented depth of vocabulary knowledge correlate with each other and with academic reading comprehension?” Table 5 presents inter-correlations among six dimensions of analytic relations of vocabulary depth knowledge and academic reading comprehension.

Table 5. Correlations among Six Components of Analytic Relations with Each Other and Academic Reading Comprehension

	Component-Integral	Member-Collection	Portion-Mass	Stuff-Object	Feature-Activity	Place-Area
Member-Collection	0.481**	---				
Portion-Mass	0.500**	0.398**	---			
Stuff-Object	0.581**	0.300**	0.273**	---		
Feature-Activity	0.477**	0.370**	0.331**	0.278**	---	
Place-Area	0.416**	0.330**	0.222**	0.414**	0.257**	---
RC	0.499**	0.225**	0.373**	0.098	0.280**	0.221**

** Correlation is significant at the 0.01 level (2-tailed)

As shown in Table 5, inter-correlations among the scores of six independent variables were all statistically significant. A significant and positive correlation at the 0.01 level ($r = 0.481$; $p = .001$) was found between

component-integral part of analytic relations and member-collection part of analytic relations of vocabulary depth knowledge. This suggests that those students who learned component-integral part of analytic relations also mastered the member-collection dimension of analytic relations. Also, a significant and positive correlation at the 0.01 level ($r = .500$; $p = .000$) was found between component-integral part of analytic relations and portion-mass part of analytic relations of vocabulary depth knowledge. This shows that those students who learned component-integral part of analytic relations also mastered the portion-mass aspect of analytic relations. The same can be observed regarding correlation between component-integral and stuff-object facet of analytic relations. A significant and positive correlation at the 0.01 level ($r = .581$; $p = .000$) existed between component-integral and stuff-object feature of analytic relations. This indicates that those students who learned component-integral part of analytic relations also mastered the stuff-object feature of analytic relations. Out of the inter-correlations among the six dimensions of analytic relations, the significant correlation between component-integral analytic relations component of vocabulary depth knowledge and stuff-object analytic relations dimension was the highest ($r = .581$).

Moreover, component-integral analytic relations part correlated at the 0.01 level ($r = 0.477$; $p = .000$) positively in a significant way with feature-activity facet of analytic relations. This indicates that the growth of students' learning of component-integral part of analytic relations was positively proportionate to students' learning of feature-activity dimension of analytic relations. In addition, component-integral dimension held significant, positive correlation at the 0.01 level ($r = .416$; $p = .000$) with place-area feature of analytic relations. This suggests that the growth of students' learning of component-integral part of analytic relations was positively proportionate to students' learning of place-area facet of analytic relations. From the above discussion, in terms of correlations between component-integral analytic relations and other five independent variables, it can be inferred that inter-correlations among the scores of component-integral, member-collection, portion-mass, stuff-object, feature-activity, and place-area were all statistically significant.

As shown in Table 5, looking at inter-correlations between member-collection analytic relations part and other dimensions of analytic relations, it was found that inter-correlations among the scores of member-collection, portion-mass, feature-activity, and place-area analytic relations elements of vocabulary depth were positive and statistically significant. Member-collection analytic relations part did correlate ($r = .300$; $p = .000$) significantly with stuff-object analytic relations dimension of vocabulary depth knowledge. This evinces that those students who learned member-collection part of analytic relations also mastered the stuff-object aspect of analytic relations of vocabulary depth knowledge. Member-collection analytic relations part had positive, significant correlation at the 0.01 level ($r = .398$; $p = .000$) with

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

portion-mass analytic relations part. This highlights that those students who learned member-collection part of analytic relations also mastered portion-mass aspect of analytic relations of vocabulary depth knowledge. Besides, member-collection analytic relations dimension bore significant positive correlation at the 0.01 level ($r = .370$; $p = .000$) with feature-activity analytic relations part of vocabulary depth knowledge, and this entails that learners who had member-collection analytic relations knowledge also mastered feature-activity aspect of analytic relations of vocabulary depth knowledge. Furthermore, a positive, significant correlation at the 0.01 level ($r = .330$; $p = .000$) was located between member-collection analytic relations part and place-area dimension of analytic relations. This implies that learners who gained knowledge about member-collection part of analytic relations also mastered place-area dimension of analytic relations of vocabulary depth knowledge.

As presented in Table 5, correlations between portion-mass and stuff-object, and between portion-mass and feature-activity, and between portion-mass and place-area analytic relations dimensions were positive and significant. The positive and significant correlation at the 0.01 level ($r = .273$; $p = .001$) between portion-mass and stuff-object signifies that students who acquired portion-mass aspect of analytic relations also learned equally well the stuff-object segment of analytic relations, which represented depth of vocabulary knowledge. In addition, the significant positive correlation at the level of 0.01 ($r = 0.331$; $p = .000$) between portion-mass analytic relations feature and feature-activity facet of analytic relations connotes that students' mastering of portion-mass analytic relations aspect had identical proportion of gaining knowledge of feature-activity analytic relations component. Also, the positive significant correlation at the level of 0.01 ($r = .222$; $p = .006$) between portion-mass and place-area element of analytic relations implies that learners who gained knowledge about portion-mass part of analytic relations also mastered place-area dimension of analytic relations of vocabulary depth knowledge.

Results presented in Table 5 shows that stuff-object segment of analytic relations held positive and significant correlation with both feature-activity and place-area analytic relations dimensions of vocabulary depth knowledge. The significant positive correlation at the level of 0.01 ($r = .278$; $p = .000$) between stuff-object analytic relations aspect and feature-activity analytic relations part indicates that those students who had stuff-object analytic relations knowledge also learned feature-activity analytic relations dimension of vocabulary depth knowledge. Furthermore, positive, significant correlation at the level of 0.01 ($r = .414$; $p = .000$) between stuff-object and place-area analytic relations dimension suggests that the growth of students' learning of stuff-object analytic relations aspect was positively proportionate to students' learning of place-area dimension of analytic relations of vocabulary depth. Finally, as shown in Table 5, a positive, significant correlation existed at the level of 0.01 ($r = .257$; $p = .001$) between feature-activity and place-area aspect of analytic relations, which represented vocabulary depth knowledge. The results of Table 5 showed

that inter-corrections among all six variables were positive and significant. In the light of the above discussion, the significant, positive correlations among all independent variables are provided in the figure 4.

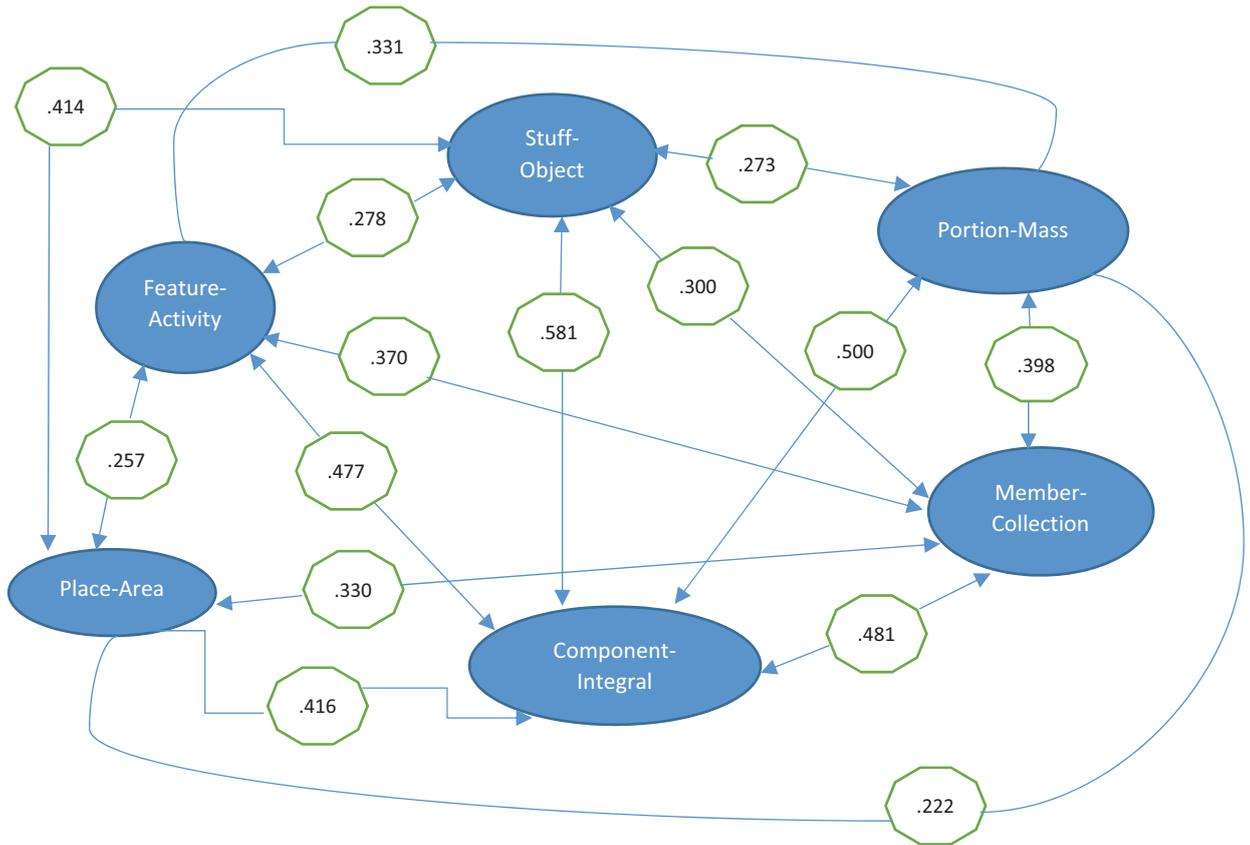


Figure 4. Correlations among the six independent variables

As presented in Table 5, the inter-correlations between the scores of all independent variables and academic reading comprehension, except between stuff-object and reading comprehension were found positive, statistically significant. A statistically significant, positive, and high correlation at the level of 0.01 ($r = .499$; $p = .000$) was found between component-integral part of analytic relations and academic reading comprehension. The correlation between component-integral and academic reading comprehension was the highest compared to associations with other independent variables and academic reading skill. Moreover, portion-mass analytic relations part bore positive and statistically significant correlation at the level of 0.01 ($r = .373$; $p = .000$) with academic reading comprehension. The inter-correlations between

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

the scores of other three independent variables, member-collection ($r = .225$; $p = .006$), feature-activity ($r = .280$; $p = .001$), and place-area ($r = .221$; $p = .007$) and dependent variable, academic reading comprehension were positive, and each correlation with academic reading comprehension was significant at the level 0.05 ($p < .01$). This signifies that those students who had more knowledge about component-integral analytic relations part performed better in academic reading comprehension compared to other dimensions of analytic relations. In addition, those Business and Engineering EFL learners who had also knowledge about portion-mass, member-collection, place-area, and feature-activity analytic relations aspects of vocabulary depth knowledge performed well in academic reading comprehension. In other words, five dimensions of analytic relations, which represented vocabulary depth knowledge, namely component-integral, portion-mass, member-collection, place-area, and feature-activity analytic relations aspects of vocabulary depth knowledge helped learners perform better in academic reading comprehension. The inter-correlations between five independent variables and academic reading comprehension are presented in figure 5.

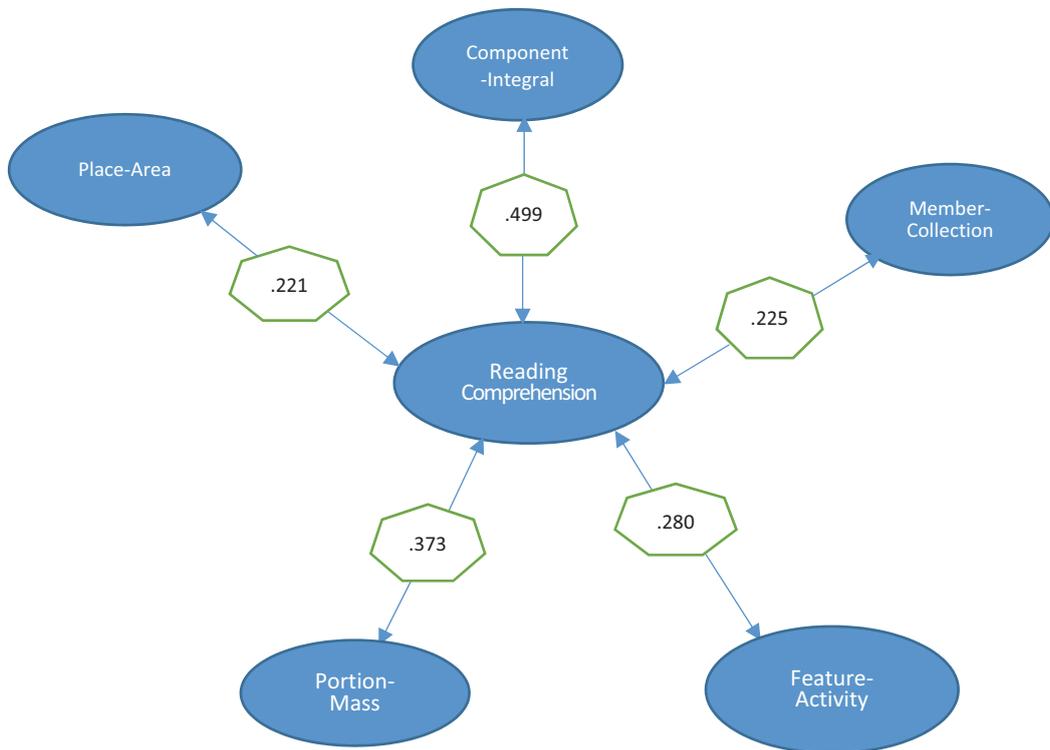


Figure 5. Correlations among five dimensions of analytic relations and academic reading comprehension

4.5 Discussion

4.5.1 Inter-correlations among three independent variables

As presented in Table 2, the correlation between morphological knowledge and analytic relations, which represented vocabulary depth knowledge had the highest, positive and significant correlation with each other ($r = .435, p < .01$). Moreover, it gives the idea that the two aspects are interconnected, and the development of morphological knowledge, which represented vocabulary depth knowledge of EFL learners contributes to the growth of their analytic relations, which represented vocabulary depth knowledge or vice versa.

As presented in Table 2, all three independent variables (i.e. vocabulary depth, morphological knowledge and analytic relations) were found positive and either strongly or moderately correlated with dependent variable, academic reading comprehension. This result was expected because syntagmatic and paradigmatic relations of vocabulary depth knowledge, the four major derivative word classes of morphological knowledge, and six features of analytic relations, which represented vocabulary depth knowledge investigated in the study showed that they formed cohort under the same construct, i.e. vocabulary depth knowledge. The obtained result of close, positive and significant inter-correlations among independent variables and dependent variable proved that the investigated three dimensions of vocabulary depth needed to be considered substantially as indispensable parts of vocabulary depth knowledge. Moreover, till to date, little empirical evidence in quantitative method research found that three dimensions of vocabulary depth knowledge formed essential dimensions under the same construct, vocabulary knowledge.

4.5.2 Relationship among the three independent variables and dependent variable

Analytic relations, which represented depth of vocabulary knowledge was positively and significantly correlated with academic reading comprehension. In other words, those students who gained more analytical relations (part-whole) knowledge performed better in reading comprehension than students with morphological knowledge and syntagmatic and paradigmatic relations knowledge. This is one of the new findings of the current research work, and this adds to the knowledge of vocabulary learning and pedagogy. Moreover, those students who gained morphological (derivative forms of words) knowledge performed better in reading comprehension than students who had knowledge of both paradigmatic and syntagmatic relations. This result did not corroborate the findings of Qian (1998, 1999, 2002). His studies indicate that those students who had both paradigmatic and syntagmatic relations knowledge performed better in academic reading comprehension than students with the knowledge of other aspects of depth of vocabulary knowledge, namely morphological knowledge. In the present study, morphological knowledge was found to have significant correlation with reading comprehension than

paradigmatic and syntagmatic relations, which represented depth of vocabulary knowledge test. On the contrary, the study of Horiba (2012) found no unique and significant effect of depth of vocabulary depth knowledge on reading comprehension. Her findings defended the findings of the current research work.

4.5.3 Correlations between syntagmatic and paradigmatic relations of vocabulary depth knowledge and academic reading comprehension

As shown in Table 3, the positive, significant correlation at the level of 0.01 ($r = .445$; $p = .000$) between paradigmatic and syntagmatic relations, which represented sub-components of vocabulary depth knowledge test signifies that the two aspects were inter-connected, and they formed an essential part under the same construct, vocabulary depth knowledge. This finding corroborated the findings of the studies conducted by Qian (1998, 1999). In addition, paradigmatic relation (i.e. word meaning subset of vocabulary depth knowledge) of vocabulary depth knowledge had stronger, significant, and positive correlation ($r = .324$; $p = .000$) with academic reading comprehension than correlation between syntagmatic (collocations, i.e. word collocation subset of vocabulary depth knowledge) relation of vocabulary depth knowledge and academic reading comprehension ($r = .269$; $p = .001$). Similarly, this finding of the present study also is congruent with the finding of studies of Qian (1998, 1999).

4.5.4 Inter-correlations between the four major derivative word forms and academic reading comprehension

As presented in Table 4, all four independent variables (i.e. noun, verb, adjective, and adverb) were positively and either strongly or moderately correlated with dependent variable, academic reading comprehension. This result was expected because all the four major derivative word classes, which represented morphological knowledge investigated in the study showed that they formed cohort under the same construct, i.e. vocabulary depth knowledge. The obtained result of close, positive and significant inter-correlations among independent variables and dependent variable proved that the investigated four major derivative classes needed to be considered substantially as indispensable parts of morphological knowledge of vocabulary depth knowledge. Till to date, little empirical evidence in quantitative method research found out that the four major derivative word classes formed essential dimensions under the same construct. Schmitt and Zimmerman (2002) revealed that the best known derivatives were verbs with 67% percentage of production whereas nouns had 63% produced. This aspect of finding out the four essential derivative word families, which represented morphological knowledge of vocabulary depth knowledge under quantitative investigation of the current research has added novelty to the knowledge domain.

4.5.5 Inter-correlations between the six dimensions of analytic relations with each other and academic reading comprehension

With respect to the scores of learners of Business and Engineering schools, as presented in Table 5, the correlation between component-integral analytic relations part had the highest, positive and significant correlation with stuff-object analytic relations part of depth of vocabulary knowledge ($r = .581, p < .01$). Moreover, this gives the idea that the two aspects are interconnected, and the development of component-integral analytic relations part of vocabulary depth knowledge of EFL learners contributes to the growth of their stuff-object analytic relations part of vocabulary depth knowledge or vice versa. Identical positive and significant correlation ($r = .500, p < .01$) was found between portion-mass and component-integral analytic relations part of depth of vocabulary knowledge. In the light of above discussion, it appears that teachers should incorporate, particularly component-integral, portion-mass, feature-activity, place-area, and member-collection analytic (part-whole) relations aspects of vocabulary depth knowledge in their vocabulary teaching materials to help students build up deeper meaning of vocabulary knowledge, which would lead them to have greater success on academic reading comprehension.

As presented in Table 4, the correlation ($r = .391, p < .01$) between adjective word class and adverbial word class, which represented morphological knowledge had the highest, positive, and significant correlation. Moreover, this gives the idea that the two aspects are interconnected, and the development of adjective word class of morphological knowledge of EFL learners contributes to the growth of their adverbial word class of morphological knowledge or vice versa. Identically, positive and significant correlation ($r = .389, p < .01$) was found between verb and adverb word class, which represented morphological knowledge. It appears that teachers should incorporate, particularly adjective, verb, and adverb derivative classes of morphological knowledge in their vocabulary teaching materials to help students build up deeper meaning of vocabulary knowledge, which would lead them to have greater success on academic reading comprehension.

As presented in Table 5, except one independent variable, stuff-object analytic relations aspect, the rest of other five independent variables, namely component-integral, portion-mass, member-collection, place-area, and feature-activity analytic relations facets were positively and either strongly or moderately correlated with dependent variable, academic reading comprehension. This result was expected because all six dimensions of analytic relations of vocabulary depth knowledge investigated in the study showed that they formed cohort under the same construct, i.e. part-whole relation of lexical knowledge. The obtained result of close, positive and significant inter-correlations among independent variables and dependent variable proved the point that the investigated six dimensions of analytic relations components needed to be considered substantially as indispensable parts of analytic relations of vocabulary depth knowledge. Till to date, little empirical evidence in

The Relationship of Sub-Components of Manifold Dimensions of Vocabulary Depth Knowledge and Academic Reading Comprehension among English as a Foreign Language Learners at Tertiary Level

quantitative method research found that these six dimensions formed essential dimensions under the same construct. This aspect of finding out six essential components of analytic relations of vocabulary depth knowledge under quantitative investigation of the current research has added novelty to the knowledge domain.

5 Conclusion

Armed with the above discussion, the following points summarize all four research questions of the current study. Firstly, analytic relations, which represented depth of vocabulary knowledge was positively and significantly correlated with academic reading comprehension. In other words, those students who gained more analytical relations (part-whole) knowledge performed better in reading comprehension than students with morphological knowledge and syntagmatic and paradigmatic aspects of depth of vocabulary knowledge. Secondly, students who had more paradigmatic (synonyms) relation knowledge performed better in academic reading comprehension than those who had syntagmatic relation (collocations) knowledge, one of the two sub-tests of vocabulary depth knowledge test. Thirdly, the four major derivational word forms, i.e. all independent variables (i.e. noun, verb, adjective, and adverb) were positively and either strongly or moderately correlated with dependent variable, academic reading comprehension. Fourthly, except one independent variable, stuff-object analytic relations aspect, the rest of other dimensions of analytic relations, namely component-integral, portion-mass, member-collection, place-area, and feature-activity analytic relations facets were positively and either strongly or moderately correlated with dependent variable, academic reading comprehension.

5.1 Implications for teaching

Many language teachers would acknowledge that knowledge of vocabulary depth plays crucial role in learners' academic success, yet it is still ignored in teaching English in EFL context, even in Bangladesh since there is tendency to be observed among Bangladeshi teachers to follow blindly the books or curriculum prescribed in western countries. The context of teaching English as L1 (native language) in western countries is different from oriental perspective, and the current study corroborated the significance of sub-components of three different aspects of vocabulary depth and their correlation with academic reading success.

To the best knowledge of the researchers, little is known about studies that included all the discussed sub-tests of three separate dimensions of depth of vocabulary knowledge jointly and their correlation with academic reading success, and conducting the present research with comprising all three sub-sets of three different facets of vocabulary depth knowledge to figure out their

association with academic reading success under quantitative research investigation has added novelty to the body of knowledge.

To conclude, the current study added to the understanding of association between three major sub-components of three aspects of vocabulary depth knowledge and academic reading comprehension, but limitations still remains. Participants included in the study were from the same university, so more learners from different levels of educational sectors would make this study more comprehensive.

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Foreign Language Learners at Tertiary Level

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The Relationship of Sub-Components of Manifold Dimensions of Vocabulary
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