

CAN TECHNICAL VOCABULARY KNOWLEDGE BE A PREDICTOR OF SUCCESS: A Case in Pharmacology

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ABSTRACT

Given the cost and difficulty of running medical education programs instructed in a second language, the selection of students who are likely to perform well becomes an important consideration. Previous studies have focused on different predictors such as aptitude, personality and English language proficiency. The purpose of the present study was to examine the potential offered by technical vocabulary recognition levels of the students as predictors of their success. To this end, a frequency based corpus of 162 technical words was established from their textbook. Taking Nation's Levels Test as a model, a receptive technical vocabulary test was constructed and administered to 88 students at the end of the semester. The scores were correlated with the grades they were awarded in pharmacology. The findings of the study reveal that the students' technical vocabulary test results correlated significantly with their grades.

Keywords: Pharmacology, technical vocabulary, academic success, concordance.

INTRODUCTION

Medical education programs instructed in a second language are not only costly to run in terms of the demands they make on resources at a variety of different levels, but also very difficult for the students in the program. These programs are expensive on operative and administrative levels. In our country different universities run similar programs in a second language, however, when compared to the number of programs offered, the number of academicians who can lecture in second language is few in number. Starting with the fourth year in these programs many course operate optimally with low student-professor ratios. On the other hand, the universities running programs in a second language have to offer a preparatory language program to the students with language problems, and this means an extra academic year. Because of these two main reasons the operational and administrative costs increase. The students in these programs who are likely to do well require minimal administrative support and graduate on time. Therefore, determining their language problems at the very early stages is extremely important. To do this certain reliable tools are needed.

Prediction of success has been the subject of a large number of studies over the last three decades. In these studies a number of predictors have been found to be correlated to academic success, such as aptitude (Petersen & Howe, 1979; Sedlacek & Javaune, 1992), personality (Farsides & Woodfield, 2003; Conard, 2006) and English language proficiency (Graham, 1987; Vazquez, Vazquez, & Lopez, 1997). Among these different variables English language proficiency is the main interest of this study because of the reasons mentioned above.

Due to the nature of their program, one of the main problems our students encountered is the reading load. They are expected to read and understand many numbers of textbooks in their second language during a single academic year. The students enrolled in our program complained about this load and some constantly reported comprehension problems.

In most cases the comprehension problems resulted in failure and some of the students either dropped out or repeated, and hence lost time. When students were asked to clarify the reasons of their comprehension problems they indicated the technical vocabulary load of their textbooks as one of the major difficulties hampering their comprehension, and thus affecting their success. Thus, this study was designed in order to investigate whether a relationship between students' technical vocabulary knowledge and their academic performance exists and whether the Technical Vocabulary Recognition Test designed for this study can be used as a predictor of academic success. If this is the case, it will serve as a tool to identify students in need of academic and language support.

RESEARCH IN THE FIELD

Today most people in the field agree that control over lexicon either hampers or facilitates reading comprehension. Especially in the context of second language, learners mostly depend on their vocabulary knowledge as their first resource of comprehension. Vocabulary was found to be a good predictor of comprehension (Qian, 1999; Riedel, 2007). The findings of the previous studies indicated that vocabulary knowledge is an important predictor of efficient reading and of academic success in general (Laufer & Sim, 1985; Qian, 2002). The importance of lexical knowledge to academic success in native speakers has been dealt with by a variety of different researchers over the last two decades (Astington & Jenkins, 1999; Corson, 1997; Morris, 2003; Olson, 1994). The findings of these studies suggested that students' vocabulary knowledge strongly correlates to overall academic success. Similar results were found in the investigations of second language learners' lexical knowledge (Swain, 1981; Cummins, 2000).

In most of the above mentioned studies, the relation has been investigated by correlating the academic success to vocabulary knowledge, especially academic vocabulary. However, vocabulary in medical textbooks is highly technical. Two recent studies displayed a similar finding about the nature of medical texts. In their study comparing an anatomy and applied linguistics text Chung and Nation (2003) found that technical vocabulary made up a very substantial proportion of both the different words and the running words in the texts, with one in every three running words in the anatomy text. Chen and Ge (2007) studied the word frequency and the text coverage of the 570 word families from Coxhead's Academic Word List (AWL) in medical research articles (RAs). They found that the text coverage of the AWL words accounted for around 10.07% in English medical RAs and thus the AWL is far from complete in representing the academic words frequently used in medical RAs.

In this study we aimed to examine the relation between students' technical vocabulary knowledge and their academic performance. The goal of this study was to investigate the predictive potential of Technical Vocabulary Recognition Test.

MATERIALS METHOD

Participants

The study involved 88 second year medical program students at a private university in Turkey. The participants were admitted into their program of study after a year of general English preparatory year. All were non-native-speakers with an upper intermediate proficiency in English. Most of the students had roughly seven years of classroom English instruction behind them. For most of them, this instruction had consisted of 2-5 hours per week focused mainly on reading skill.

Data Collection

A corpus-based research approach was adopted to identify the technical words in pharmacology and their frequencies as appeared in their textbook via using Concordance 3.2 computer program.

Standardization was undertaken to remove the uncountable parts, such as charts, diagrams, bibliographies or other components in texts which were not able to be processed by computer analyzing programs. The total computerized words were 20114 and tokens were 463351. A Corpus of Pharmacological Words (CPW) consisted of 162 technical words was created. To make sure of the selection of the technical words an inter-rater reliability check was carried out. The reliability accuracy score was used to estimate the degree of agreement between the researchers' results and the rater's. For the inter-rater reliability check, randomly selected words were classified as being technical or non-technical words by rating them on a four point scale designed by Chung and Nation (2003). The rater was a qualified pharmacologist blinded to the study. The total agreement score we found was 0.85. Since a raw accuracy score of 0.7 is acceptable, this result of accuracy was satisfactory.

In the present study, determination of the students' technical vocabulary recognition levels was done in the following way: The technical words, identified as a result of the process mentioned above, were subdivided into three frequency lists by rank as frequent, less frequent and the least frequent. From these sub-lists, using Nation's (1990) Vocabulary Levels Test as a model, a Technical Vocabulary Recognition Test was constructed. The technical words used in the test were randomly selected from the sub-lists by the researchers. The test is a word-definition matching test. The test consisted of 90 words and 45 definitions, in groups of six and three respectively, as in the following example:

1. absorption
2. affinity _____ a drug occupying a receptor but not activating the receptor
3. agent _____ tendency of a drug to combine with its receptor
4. agonist _____ substance acting on living systems at the chemical level
5. amino glycoside
6. antagonist

The test was piloted with 40 students of pharmacy for the reliability analysis. The Cronbach's alpha was found to be .82. The test was administered at the beginning of the semester. It took about 30-40 minutes to complete the test. The answers were scored in terms of correct/incorrect for each item and each correct answer was given one point. Then the scores were correlated to the grades the students were awarded in pharmacology final exam at the end of the year. Correlations were calculated using Pearson.

FINDINGS

In order to investigate the relation between students' technical vocabulary knowledge and their academic performance data obtained from the Technical Vocabulary Recognition Test and the final grades was statistically analyzed. The minimum and maximum scores, means and standard deviations were presented in Table 1.

Table 1
 Means and standard deviations of technical vocabulary recognition test

	Minimum (n=88)	Maximum (n=88)	Mean (n=88)	SD
Sub-list 1	0	15	10,19	3,14
Sub-list 2	0	13	7,20	2,78
Sub-list 3	0	11	5,47	2,76
Total	0	35	22,9	7,55

By looking at the mean scores of the sub-lists displayed in Table 1, we can see how the students' technical vocabulary recognition levels change as the word frequency level decreases. While the mean score for sub-list 1 is 10.19, it 7.2 for sub-list 2 and 5.47 for sub-list 3.

The results of the correlation analysis were given in Table 2.

Table 2
 Correlations between final grades and Technical Vocabulary Recognition Test scores

	N	<i>r</i>	<i>p</i>
Final - Sub-list 1	88	0,26*	,015
Final - Sub-list 2	88	0,34**	,001
Final - Sub-list 3	88	0,40**	,000
Final – Total	88	0,38**	,000

* Correlation is significant at the 0.05 level (2-tailed).

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

As can be seen from the *p* values in the table, we found statistically significant correlations between the final grades and the test scores in all the three sub-lists and the total test scores ($p < 0.05$). But the correlations we found were not strong correlations ($r = 0.26$; 0.34 ; 0.40 and 0.38 , respectively). The highest correlation was found between sub-list 3, the least frequent technical words, and the final grades ($r = 0.40$). It is clear that none of these correlations is high enough to see technical vocabulary knowledge as predictor of success. However, these correlations are nonetheless noteworthy as they present a pattern.

DISCUSSION

This study aimed at investigating the assessment potential offered by Technical Vocabulary Recognition Test as a predictor of academic success. To this end the relation between the academic success of the students and their technical vocabulary knowledge levels were correlated. Previous research in the field has focused on the relation between general vocabulary knowledge and academic success. However, the current study examined this relation with regards to technical vocabulary. Overall the result of the correlation analysis yielded a positive relation between the final grades the students were awarded and their technical vocabulary knowledge. As was previously mentioned, the correlations found were low enough to exclude the possibility of using Technical Vocabulary Recognition Test as a tool to determine students who would likely to experience

academic problems. However, we believe that had the technical vocabulary list been extended in order to include all the technical words used in the other courses of the program, it is quite likely that its value as an assessment instrument would have been much greater.

Still using such kind of a tool as part of a language assessment instrument, particularly for students of medicine, is worthy of consideration, since there is evidence that it can provide information about students who might have difficulty in reading comprehension and lexical knowledge.

CONCLUSION

Academic success may require different levels of language skills for different academic majors. Our research was conducted on the basis of our belief in the important role of technical vocabulary knowledge in academic performance.

Different from many previous studies that were mostly on academic words used across a number of scientific fields, our study has a more specific focus on the technical words used in one particular branch of a scientific field – pharmacology. The question addressed in the study was the extent to which technical vocabulary recognition levels of the students could predict their academic success. Statistically significant, but a low level of correlation was found between the students' technical vocabulary recognition test results and their grades.

Our research is only a tentative study on the technical words used in pharmacology and more efforts should be made in exploration of this set of words in the medical field. We believe that establishing a medical technical vocabulary list and developing a curriculum with these lists in EAP courses will better cater for the needs of medical students who are in need of but have difficulty in proficient use of these words. While the levels of correlation between vocabulary recognition and academic performance found in this study were not high, they were nonetheless, statistically significant and might have been even more significant if extended to the whole medical program. Thus, the study should be repeated with a larger technical vocabulary list and with different levels of students.

This study substantiates the necessity of providing systematic vocabulary instruction due to the following conclusions: a relationship exists between technical vocabulary and achievement; vocabulary specific to the major must be taught in EAP courses.

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REFERENCES

- Astington, J. W., & Jenkins, J. M. (1999). A longitudinal study of the relation between language and theory-of-mind development. *Developmental Psychology*, 35, 1311–1320.
- Chen, Q. & Guang-chun, G. (2007). A corpus-based lexical study on frequency and distribution of Coxhead's AWL word families in medical research articles (Ras). *English for Specific Purposes*, 26, 502–514.
- Chung, T.M. & Nation, P. (2003). Technical vocabulary in specialised texts. *Reading in a Foreign Language*, 15 (2), 105-116.
- Conard, M., A. (2006). Aptitude is not enough: how personality and behavior predict academic performance. *Journal of Research in Personality*, 40(3), 339-346.
- Corson, D. (1997). The learning and use of academic English words. *Language Learning*, 47(4), 671–718.
- Coxhead, A. (2000). A new academic word list. *TESOL Quarterly*, 34(2), 213-238.

Cummins, J. (2000). Language, power and pedagogy: Bilingual children in the crossfire. England: Multilingual Matters.

Farsides, T. & Woodfield, R. (2003). Individual differences and undergraduate academic success: the roles of personality, intelligence, and application. *Personality and Individual Differences*, 34(7), 1225-1243.

Graham, J., G. (1987). English language proficiency and the prediction of academic success. *TESOL Quarterly*, 21(3), 505-521.

Laufer, B. & Sim, D. (1985). Measuring and explaining the reading threshold needed for English for academic purposes texts. *Foreign Language Annals*, 18(5), 405-413.

Morris, L. (2003). Linguistic knowledge, metalinguistic knowledge and academic success in a language teacher education programme. *Language Awareness*, 12(2), 109-123.

Nation, P. (1990). *Teaching and Learning Vocabulary*. Boston: Heinle & Heinle Publ.

Olson, D. R. (1994). *The World on Paper: The Conceptual and Cognitive Implications of Reading and Writing*. Cambridge: Cambridge University Press.

Petersen, C. G. & Howe, T., G. (1979). Predicting academic success in introduction to computers. *AEDS Journal*, 12(4), 182-91.

Qian, D. D. (1999). Assessing the roles of depth and breadth of vocabulary knowledge in reading comprehension. *Canadian Modern Language Review*, 56(2), 282-308.

Qian, D. D. (2002). Investigating the relationship between vocabulary knowledge and academic reading performance: an assessment perspective. *Language Learning*, 52(3), 513-536.

Riedel, B. W. (2007). The relation between DIBELS, reading comprehension, and vocabulary in urban first-grade students. *Reading Research Quarterly*, 42(4), 546-567.

Sedlacek, W., E. & Javaune, A., G. (1992). Predicting the academic success of student-athletes using sat and noncognitive variables. *Journal of Counseling and Development*, 70(6), 724-27.

Swain, M. (1981). Bilingual education for majority and minority language children. *Studia Linguistica*, 35(1-2), 15-32.

Vazquez, E. G., Vazquez, L. A. & Lopez, I., C. (1997). Language proficiency and academic success: relationships between proficiency in two languages and achievement among Mexican American students. *Bilingual Research Journal*, 21(4), 334-347.