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Lexical Terms in the Physical Sciences: Basis for Instructional Material Production in English

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Abstract *- This study aimed to classify and analyze the key lexical terms and their derivations found in each two selected textbooks of Chemistry and Physics. These key lexical terms and their derivations were analyzed based on their lexical forms and meanings and further classified in the context of their linguistic levels. On the descriptive qualitative research design with emphasis on content analysis was used in this study. Key lexical terms and their derivations related to Chemistry and sub-divisions of Physics. Further, the Self-learning Module in English was prepared such that they integrated some selected key lexical terms and their derivations as were included in the list. The lesson includes reading comprehension, Speech improvement, Vocabulary Skills, Basic Sentence Pattern and Subject-Verb Agreement. The results indicated that there were 1, 458 overall total of key lexical terms including derivations in Chemistry and Physics classified into four linguistic levels. It is also found that physical science lexical terms could be integrated in the English language structure in any learning material in English using different approaches in teaching besides being very rich source of developing or increasing word power both for teachers and students. Therefore, it is recommended that collaborative or integrative teaching should be encouraged for the English and Physical Sciences considering that the disciplines are highly complementary and supplementary to each other.*

Keywords – Lexical Terms, Physical Sciences, Instructional Material

INTRODUCTION

The earth has become a world full of scientific wonders. People now live in an age when growth in scientific discovery is almost explosive. Results of these scientific labors are evident in the form of material abundance and convenience which are being enjoyed now. Yet, the human mind has not stopped and will never stop probing the unknown and improving what is already known. Science will ever remain an adventure of the human mind.

In the modern world of science, the body of factual information has been increasing rapidly and understanding them is deepening. Old words and new words are constantly creeping into scientific writing. These words found in scientific writings have put difficult burden on the science students and teachers as well.

Meanwhile, the trend of integrating science with English instruction is presently met by current pragmatic trend in the teaching of English for Special Purposes (ESP) which is an especially congenial approach to the language thrust of the country's bilingual policy.

Within the realm of teaching English for Special Purposes (ESP), advocators have assumed that the learners of the English language have special purposes.

Enriching students' understanding of scientific vocabulary, a primary step in reinforcing non-science context, will be of vital importance in reading, for no one can understand what he reads if he does not understand the meaning of words.

In contemporary world of education, even in language learning, the physical sciences are included in the primary, secondary, and tertiary level curricula because of the very rich concepts associated with them.

Drawing content words from the physical sciences for use in communication arts activities in English will make classroom activities more meaningful to both teachers and students. Students' exposure to the content words pertaining to the physical sciences in the context of English will in turn reinforce the

students' learning in their studies of Chemistry and Physics.

While it is recognized that language teachers could not possibly teach all the vocabulary needed as tools for all other subjects in college, it is believed that assistance in developing most of the important vocabulary in physical sciences can be coursed through the subject English.

with our listing; we must always keep the idea of parallelism grounded firmly in the forefront of our minds (Writing Center at Chapman University, 2021).

Thus, this research talks about the classification and analysis of lexical terms and their common derivations according to their linguistic levels and lexical meanings in the physical sciences with the following formulated objectives: (1) To determine the key lexical terms in Chemistry and Physics that are appropriate to enrich College English teaching activities; (2) To determine the common derivations of the key lexical terms as used in the textbooks of Chemistry and Physics; (3) To determine the distribution of the key lexical terms and their derivations in the Physical Sciences according to the four linguistic levels; and (4) to develop instructional material to illustrate the use of lexical terms and their derivations in teaching English.

METHODOLOGY

Descriptive -qualitative method of research with emphasis on content analysis method of investigation. This method was most appropriate for the study because the textbooks used in the physical science courses were analyzed for commonly used key lexical terms and their derivations. The key lexical terms and their derivations were classified and analyzed in the context of their linguistic levels.

RESULTS AND DISCUSSIONS

Key Lexical Terms in Chemistry and Physics

There are 526 key lexical terms including those which have and do not have derivations arbitrarily listed from the two textbooks used in each of the following specific disciplines as Chemistry and Physics.

Particularly, the greatest number of key lexical terms are observed to belong to Physics, with 268 or 50.95 percent of the total corpus while Chemistry has 258 or 49.05 percent of the total in the list.

In analyzing the lexical form, in Chemistry, there are 100 lexical terms in their simple form. On the other hand, there were 48 lexical terms in their bound form while a total number of 145 key lexical terms in their full form and there are 485 lexical terms in their free from. The free form constitutes the greatest number based on the total number of lexical terms in Chemistry under different linguistic forms.

Derivations of Key Lexical Terms

The table reveals that the total number of derivations of key lexical terms found in each of the two textbooks used in Chemistry and Physics courses are 932. Further, the table discloses that Chemistry has a greater total number of derivations with that of Physics.

Discipline	Key Lexical Terms	Number of Derivations	Total	Percentage %
Chemistry	136	520 (Prefix =37) (Suffix = 437) (Both = 46)	656	55.03
Physics	124	412 (Prefix = 25) (Suffix = 330) (Both = 57)	536	44.97
Total	260	932	1192	100

As regards the mode of derivations, the full morpheme that constitutes the core of such words is called root, while the empty morphemes that are added to a root to form

larger units are called affixes. Meanwhile, affixes which precede the root are called prefixes while affixes which follows the root are suffixes.

By the addition of the proper affix, a noun can be derived from an adjective, and a noun from a verb, a verb from an adjective, an adjective from a noun, and an adverb from an adjective.

Linguistic Level of Key Lexical Terms and Their Derivations

Discipline	Invented Single-Referent	%	Specific Single Referent	%	Similar Single-Referent	%	Shared Single-Referent	%
Chemistry	44	31.21	568	57.49	66	50	100	50.76
Without Derivations	4		75		13		30	
With Derivations	3		73		28		32	
Derivations	37		420		25		38	
Physics	97	68.79	420	42.51	66	50	97	49.24
Without Derivations	17		81		13		33	
With Derivations	9		62		28		25	
Derivations	71		277		25		39	

It is easy to note what linguistic levels the key lexical terms in Chemistry and Physics are very much reflective.

The data show that, on the whole, there are 1,458 key lexical terms including their derivations which are arbitrarily listed from each two selected textbooks in Chemistry and Physics.

Distributed into the four linguistic levels, the number of key lexical terms and their derivations vary from one linguistic level to another.

The data reveal that Chemistry has a greater number of lexical terms classified under the specific single-referent level of classification with 568 or 57.49 percent of the total corpus of specific single-referent across disciplines.

On the other hand, Physics has greater number of lexical terms classified with 97 or 68.79 percent of the total corpus of invented single-referents across disciplines.

Modular Lesson or Self-Learning Kit

One of the current educational innovations is the development of modules or the so-called Self-Learning Kit, which aims to focus attention on the learner and his unique personal characteristics.

Modules are self-contained instructional units that contain within them the basic elements of instruction such as objectives, learning activities and evaluation. The use of modules is an effective way of developing skills, understanding and appreciation. Using them would bring about learning with a minimum of teacher direction and supervision, since these are self-contained (Eballa, 2000).

The basic model of instructional module contains an introduction which explains the significance of the contents; a pre-test to determine the strengths and weaknesses of the learner as he enters the program in relation to the subject matter to be learned; a list of objectives stated in the behavioral objective terms; modular activities or enabling activities which are organized according to specific objectives of the modules; post-assessment tests which evaluate the performance of the learner in terms of objectives and provisions of answers to the test.

In the use of modules, the teacher has roles to play in the entire process of individualization. Her role is to see to it that instructional materials are made available to the students who will be using. The teacher as teacher is the least important role that the professional teacher assumes in an instructional system where the learner is the center of the learning process.

The modular lesson contributes much on the development of the students' Language Skills. This is in view of the fact that students, as individuals, have their own interests, needs, and abilities. Also, the use of the Self-Learning Module will enable the child to succeed in the learning process, and to propel himself toward learning more, hence, this module is self-contained.

CONCLUSIONS

Based on the foregoing summary of findings, the following conclusions are deemed appropriate:

1. Chemistry and Physics lexical terms:
    a. are essential for the

understanding and meaningful study of Chemistry and Physics courses.

b. have specific meanings and peculiar patterns of word formation.
c. convey multiple meanings in either shared or similar single-referent across disciplines of Chemistry and Physics.
d. are available for the English teachers to enrich and vitalize the study of English language.

2. Textbooks in Chemistry and Physics are abundant sources of vocabulary which are useful both to the students and the teachers.
3. The modular approach of teaching English using lexical terms in Chemistry and Physics can be predictable in enriching and vitalizing the teaching of College English.
4. The module allows the students to work independently and bring about self-direction. The student is given the freedom to decide and learn in his own unique style, thus developing the students' self-concept. The skills, the analytical mind and values are all developed in a child through the use instructional modules.

RECOMMENDATIONS

In the light of the findings and evidences presents in the study, the following recommendations are highly proposed:

1. A similar study about lexical terms should be conducted in other physical science disciplines to identify lexical terms and derivations which are very useful in teaching the English language.
2. Integrative teaching should be encouraged for the English and Physical Science classes considering that the disciplines are highly complementary and supplementary to each other.
3. The prospective English major teachers should be encouraged to minor in the physical Sciences, or vice versa, for the abovementioned reasons.
4. The use of the Physical Science texts as reference materials in teaching English should be encouraged.
5. The Modular Lesson using physical science key lexical terms and their derivations should be used sparingly on special lessons during special occasions particularly those pertaining to national celebrations and local events of importance.

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