

การเรียนรู้คำศัพท์เฉพาะสาขา: ความจำเป็นในแง่มุมมองของ
ผู้เรียนภาษาอังกฤษเพื่อจุดประสงค์เฉพาะและ
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SPECIALIZED VOCABULARY LEARNING ACROSS DISCIPLINES: EXPLORING ESP LEARNERS' NEEDS AND FOSTERING VOCABULARY LEARNING STRATEGIES FOR PROFESSIONAL COMMUNICATION

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บทคัดย่อ

การเรียนรู้และความคงทนในการจดจำคำศัพท์เฉพาะสาขาเป็นสิ่งสำคัญสำหรับผู้เรียนในระดับอุดมศึกษาที่เรียนวิชาภาษาอังกฤษเพื่อจุดประสงค์เฉพาะในทุกสาขาวิชา เพราะผู้เรียนจำเป็นต้องเข้าใจบทอ่านเฉพาะสาขา และเพิ่มพูนสมรรถนะทางด้านคำศัพท์ เพื่อพัฒนาความสามารถทางด้านทักษะการสื่อสารในอันที่จะเตรียมตัวสำหรับงานอาชีพในอนาคต บทความนี้จึงได้อธิบายเรื่องบทบาทของคำศัพท์เฉพาะสาขาในวิชาภาษาอังกฤษเพื่อจุดประสงค์เฉพาะ โดยเน้นไปที่ความจำเป็นทางด้านการเรียนรู้คำศัพท์ในหลาย ๆ มิติเพื่อความเข้าใจและการสื่อสารในบริบทการทำงาน รวมถึงอธิบายรูปแบบกลวิธีในการเรียนรู้คำศัพท์ทั้งรูปแบบที่ใช้กันอยู่อย่างแพร่หลายตั้งแต่อดีตและรูปแบบใหม่ ๆ ไม่ว่าจะเป็นการเก็บข้อมูลจากคำศัพท์ที่ใช้กันอยู่จริง หรือการใช้เทคโนโลยีรูปแบบใหม่ ๆ ในการรวบรวมคำศัพท์ ซึ่งกลวิธีเหล่านี้ช่วยให้กระบวนการเรียนรู้คำศัพท์เป็นไปได้อย่างมีประสิทธิภาพ และสร้างแรงจูงใจในการเรียนรู้คำศัพท์เฉพาะสาขา ยิ่งไปกว่านั้น บทความนี้ยังได้กล่าวถึงประเด็นปัญหาและข้อจำกัดที่สำคัญอันเป็นอุปสรรคต่อการเรียนรู้คำศัพท์เฉพาะสาขา รวมถึงความจำเป็นในการฝึกฝนผู้เรียนให้มีกลวิธีในการเรียนรู้คำศัพท์เฉพาะสาขา และการนำกลวิธีดังกล่าวมาใช้อย่างมีประสิทธิภาพ เพื่อให้ผู้เรียนมีความเข้าใจการใช้คำศัพท์และสามารถสื่อสารได้เป็นอย่างดี บทสรุปของบทความนี้ได้กล่าวถึงบทบาทของผู้สอนภาษาอังกฤษเพื่อจุดประสงค์เฉพาะในการเอื้อให้เกิดกระบวนการเรียนรู้คำศัพท์ และข้อเสนอแนะในการเรียนรู้คำศัพท์เฉพาะสาขาเพื่อเพิ่มประสิทธิภาพการเรียนรู้ทั้งในชั้นเรียนและนอกชั้นเรียน

คำสำคัญ: ภาษาอังกฤษเพื่อจุดประสงค์เฉพาะ กลวิธีในการเรียนรู้คำศัพท์ การเรียนรู้คำศัพท์ คำศัพท์เฉพาะสาขาสมรรถนะทางด้านคำศัพท์

Abstract

Specialized vocabulary acquisition and retention is crucial for tertiary level learners in English for Specific Purposes (ESP) courses in a particular discipline to comprehend subject-specific texts and enhance lexical competence to develop their communicative ability in preparation for their future careers. This article outlines the role of specialized vocabulary in ESP courses while highlighting various aspects on learners' lexical needs for their comprehension and communication in professional contexts. This paper also provides an overview of vocabulary learning strategies, ranging from the most common to the recent which include data-driven and technology-based strategies that facilitate ESP learners' vocabulary acquisition and raise their motivation in specialized vocabulary learning. Moreover, the major issues and limitations impeding learners' progress in specialized vocabulary learning are addressed. The paper also sheds light on the need of learner training for fostering specialized vocabulary learning strategies by teachers and employing them effectively for comprehension and communication purposes by learners. The article concludes with a discussion by ESP practitioners in facilitating the vocabulary learning process and recommendations for specialized vocabulary acquisition and enhancement activities inside the classroom and beyond.

Keywords: English for Specific Purposes (ESP), Vocabulary Learning Strategies, Vocabulary Acquisition, Specialized Vocabulary, Lexical Competence

Introduction

While globalization and the demand of professionals with communicative competence in all careers has been greatly increasing, teaching and learning discipline-specific language skills in English for specific purposes (ESP) courses have emerged to equip students with interactional and transactional communication skills for their future workplace as effective communicative ability is synonymous with business success. Until recently, ESP scholars and researchers have presented their pedagogic views on vocabulary as a basic tool for communication and subject-specific knowledge, and they are fundamental to language teaching, successful language acquisition, and comprehension of the texts in students' respective fields, and their future development (Brooks, 2014; Criado & Sanchez, 2009; Donesch-Jezo, 2014; Hall, 2012; Liuliene & Metiūnienė, 2013; Maharaj, 2017). Since the fundamental characteristics of ESP is defined to meet specific needs of learners, this article first highlights the learners' academic and professional needs in vocabulary learning and discusses what types of vocabulary they should focus on and how much vocabulary learning they need.

To facilitate learners' specialized vocabulary learning and acquisition process, utilization of vocabulary learning strategies (VLS) plays a vital role in fostering productive knowledge and mastery of subject-specific lexical items. As Wu (2014) stated, teachers' effective teaching strategies can motivate struggling learners, and vocabulary learning strategies should be addressed in ESP classrooms due to its close relationship with comprehension and application of reading and other communication skills. To this end, the article describes a wide range of vocabulary learning strategies in ESP contexts, supported by the outcomes of empirical investigations made by several ESP scholars. It also suggests ESP practitioners to introduce their learners to a variety of vocabulary learning strategies through tasks and activities to make their vocabulary learning more effective and meaningful and allow them to become more autonomous with increased communicative abilities.

1. ESP learners' specialized vocabulary learning for comprehension and communication needs

As Belyaeva (2015) maintains, ESP courses should focus on learners' specific needs by targeting student relevant language skills and competencies. Donesch-Jezo (2014) and Georgieva (2015) considered terminology skills as the primary focus in ESP courses at the tertiary level in order to help students achieve their goal of performing specific job functions and communicating effectively in targeted workplace situations. Particularly, when students engage with discipline-specific texts in their field of study, a large proportion of the texts are usually made up of specialized vocabulary. The study of Chung and Nation (2004, as cited in Coxhead & Demecheleer, 2018) found that technical vocabulary occupied approximately one third of the vocabulary of an anatomy textbook and one fifth of an applied linguistics textbook. For ESP students, learning vocabulary in specific language features or registers is essential for their ability to cope with specific content in their field such as genre-specific texts or discourse of a specific area of study (Brinton et al., 2003, as cited in Hou, 2014). In a Romanian context, Boeru and Cizer (2016) stressed the need of naval cadets' terminology competence in their ESP course to enable them to comprehend specialized texts and perform academic and career-related functions. Similarly, Salehi, Khadivar and Mehrabi

(2015) revealed that learning engineering terminology improves students' subject-matter background knowledge and enhances their reading proficiency, both of which are crucial for becoming future engineers. As a consequence, ESP scholars have highlighted the fact that learning specialized vocabulary is paramount for students in their ongoing studies which demand the students' time, continual effort and practice (Hirsh & Coxhead, 2009; Maharaj, 2017, as cited in McLaughlin & Parkinson, 2018). In this regard, Woodward–Kron (2008, as cited in Chirobocea-Tudor, 2018) claims that students' discipline-specific lexical knowledge can help them comprehend their subject-matters more accurately and will contribute to their success in professional communication skills.

In addition to ESP learners' pedagogic needs, many studies have focused on communication needs of specialized vocabulary study in their particular field (Chung & Nation, 2004, as cited in Hou, 2014). To illustrate, Donesch-Jezo (2014) and Akbari (2017) suggested medical and paramedical students learn linguistic and lexical features of specialized vocabulary in medical English courses, emphasizing meaning, pronunciation and usage in registers used in their branch of medicines to make their work more effective and accurate in professional communication, such as writing case histories, giving orders to patients and nurses and discussing problems with patients and hospital staff. In the same way, Bosher and Smalkowski (2002, as cited in Riahipour & Saba, 2012) acknowledged that maximizing students' competence in medical terminologies is increasingly salient to their communicative functions in real-life hospital situations. In the contexts of business, economics and finance, according to Troufanova and Inozemtzeva (2015) and Belyaeva (2015), business vocabulary acquisition should be emphasized for professional communicative competence of economics students and financial terms should be focused on in order to help prepare finance or business administration major students to meet their communication needs and carry out their responsibilities in their prospective future workplaces. Fiorito (2005, as cited in Liulienė & Metūnienė, 2013) warned that students' lack of lexical competence will result in communication breakdowns in professional situations.

2. Types and size of vocabulary required for ESP learners

To fulfill learners' lexical needs, ESP practitioners should explore and identify the types of vocabulary they should focus on and the amount of vocabulary they need to cover in order for students to comprehend their discipline-specific texts and enhance their communication skills in professional contexts. Chirobocea-Tudor (2018) contends that the crucial aspects of learning specialized vocabulary in ESP courses involves what vocabulary needs to be focused on and the extent to which the vocabulary is required for comprehending discipline-specific contexts and communicating in professional situations. The question then arises as to what vocabulary they should learn, which depends on what they need for communication purposes in their future career. As Brooks (2014) noted, priority should be given to the types of vocabulary which meet the learners' needs in the field of their particular study. To achieve this, Nunan (2015, as cited in Maharaj, 2017) classified vocabulary as receptive vocabulary: the words a learner can recognize and retrieve, but are not utilized, and productive vocabulary: the words a learner is able to recognize, retrieve, and utilize. In ESP contexts, Hall (2012, p. 1) emphasizes that "an accurate grasp of vocabulary enhances students' receptive and productive vocabulary skills".

In early empirical studies of ESP vocabulary learning, Carter (1988, as cited in Donesch-Jezo, 2014) split ESP vocabulary into two major groups: “core vocabulary, which is neutral by not indicating degrees of intensity or formality, and subject-specific core vocabulary, only expressive of a particular field”. Kennedy and Bolitho (1991, as cited in Chirobocea-Tudor, 2018), later categorized ESP vocabulary as technical and semi-technical although semi-technical words are not as specific as technical vocabulary in a specialized field of study. However, according to them, semi-technical vocabulary can be encountered more frequently in professional texts. Nation (2001, as cited in Zhang, 2013; Donesch-Jezo, 2014) gives a comprehensive overview of ESP vocabulary and detailed them accordingly: 1) high-frequency words (i.e., function words such as prepositions, articles and content words such as nouns, verbs, adjectives and adverbs; 2) academic words or sub-technical words that are common in academic texts; 3) technical words which are common in discipline-specific areas; and 4) low-frequency words that are rarely used in students’ field of study. Nation (2001, as cited in Hou, 2014; Hajiyeve, 2015) affirmed that ESP learners should learn high frequency words, which are most common and useful in the specific field of study, before low frequency words which belong to a specific field of discipline.

Aside from types of ESP vocabulary, many ESP scholars have highlighted lexical coverage or the adequate amount of vocabulary learners need to acquire in order to comprehend specific texts and effectively participate in professional communication. As Waring and Nation (2004, as cited in Chirobocea-Tudor, 2018) have manifested, if the students do not know minimum 98 percent of the vocabulary in a given specialized text, their learning process will be delayed and interrupted by looking up the meaning in dictionaries or checking with their teacher and the reading activity turns out to be boring and demotivating. Therefore, Wanpen, Sonkoontod, and Nonkukhetkhong (2013, p. 313) emphasized that “knowing adequate vocabulary can facilitate students to convey meaning in communication”. To increase students’ repertoire of new vocabulary, Maharaj (2017) recommends students achieve both breadth and depth of vocabulary knowledge which is more qualitative of knowledge and covers the number of words learners need to know. In engineering context, Hsu (2014, as cited in Nekrasova-Beker, Becker, and Sharpe, 2017) suggested that students need to know as many as 5,000 word families to meet 95 per cent lexical coverage for sufficient comprehension to understand the content of an engineering textbook. In this regard, ESP practitioners play a crucial role in exploring, identifying and determining the adequate number of lexical items to be learned and facilitate their learning process to help learners cope with the complexity of discipline-specific texts to enhance their comprehension and meet their communication needs.

3. The initial stage in specialized vocabulary learning: Features and semantic aspects

To maximize learners’ lexical knowledge, specialized vocabulary learning requires them to be exposed to diverse aspects of vocabulary such as features and meaning. Many scholars have emphasized the importance of focusing on word meaning which takes a vital role in learners’ vocabulary acquisition processes. Nattinger (1988, as cited in Dudley-Evans & St. John, 1998) suggests that the vocabulary learning process should be comprised of vocabulary acquisition, expansion, retrieval, utilization and retention. When expanding students’ lexical repertoire and enhancing their

semantic and pragmatic competencies, Maharaj (2017) and Wu (2014) argue that students need to explore the multiple meanings of context-bound specific words and comprehend the different meanings of the same word depending on the context or the particular register. According to Dudley-Evans and St. John, the retrieval of a vocabulary item from memory is aided by the grouping of words according to their meaning. When ESP learners can grasp a large number of lexical features and meanings of target vocabulary, as Criado and Sánchez (2009) argued, it will raise the students' awareness of the knowledge of vocabulary which develops their accuracy and fluency in their language skills and enable meaningful communications that are crucial to the needs of ESP learners for their target careers.

More fundamentally, Akbari (2015) noted that learners need to know the features and formation of vocabulary entailing spelling, pronunciation, meaning, affixes, derivative words, grammatical functions of the word, the concept behind the word, synonyms, connotations, collocations, and constraints on the use of the word. Xhaferi (2010) researched learning strategies employed by students at the South East European University and found that word features analysis was the participants' most-frequently-used strategy which takes into account word features involving stem word, part of speech, prefix, and so forth, to discover the meaning of new words.

4. Perspectives on major issues and limitations in learning ESP vocabulary

4.1 Adequacy of learners' English language proficiency

An issue of concern in specialized vocabulary learning in ESP courses is the fact that many second language (L2) learners are facing great challenges in comprehending and utilizing discipline-specific terms in their field of study (Nababan, 1993, as cited in Wu, 2014; Evan & Green, 2007, as cited in Gablasova, 2015). Nation (2001, as cited in Chirobocea-Tudor, 2018) discussed this issue and suggested that learners at tertiary level should have minimum intermediate level of English proficiency when taking ESP courses. Nekrasova-Beker et al. (2017) examined English proficiency of international students enrolled in an intensive English program before their admission into Faculty of Engineering of a university in the USA, and the findings indicated that there is a significant gap between L2 learners' existing lexical knowledge and lexical demand of the various sub-domains in an engineering field. Apparently, a learner's lack of required English proficiency level will hinder his or her specialized vocabulary acquisition and development process. As Paltridge (2001) points out, it is vital to establish students' individual language learning needs by conducting a present situation analysis and a pre-course test that asks students to perform target-level tasks exploring their language proficiency and background knowledge of specialized vocabulary in their field of study.

4.2 Effectiveness of vocabulary teaching in ESP courses

When equipping students with technical vocabulary skills in an ESP classroom, a teacher's instruction in an ESP program may have both positive and negative effects on their learners' specialized vocabulary acquisition and application, because a teacher's ineffective teaching can lead to a lack of full comprehension and ineffective communication skills on the students' part which hampers their employability and fluency in their future workplace. While the needs of ESP learners vary, Liulienė and Metiūnienė (2013) suggested to ESP practitioners that teaching methods should not be the same as those in general English programs since learners need to

acquire specialized vocabulary and comprehend subject-specific texts that contrast with those in general English in terms of purpose and complexity. Hoa and Mai (2016) revealed the outcomes of their study that unemployment of Vietnamese students resulted from being unable to meet the employers' expectations due to a lack of effectiveness in teaching-learning of ESP courses in Vietnamese universities.

4.3 Learners' utilization of vocabulary learning strategies

Needless to say, learners' motivation has a great influence on their vocabulary learning. Chirobocea-Tudor (2018, p.172) asserted that "motivating students to learn vocabulary can be a daunting task in this day and age, because learning vocabulary has traditionally been perceived as boring because it is a long process that requires time and patience". To overcome this, many studies have suggested that students need to employ learning strategies that can scaffold them to achieve their goals in specialized vocabulary learning. Thus, equipping ESP students with effective vocabulary learning strategies plays a major supporting role in their vocabulary acquisition process. Students' utilization of vocabulary learning strategies for vocabulary acquisition also depends on the types of their word knowledge, namely declarative knowledge and procedural knowledge gained through conscious or explicit learning and implicit or incidental learning and consolidation of both types of knowledge needs memorization by rehearsal or repetition before automatization which will lead to fluency in communication (Criado & Sanchez, 2009).

Wanpen et al. (2013) and Tskhvitava (2016) suggested that applying strategies become essential for success in learning due to learners' difficulties in taking grasp of specialized vocabulary in students' field of study. On the other hand, Tskhvitava (2016, as cited in Chirobocea-Tudor, 2018) attested that despite more time spent on expanding their lexicon, the outcomes of ESP students' recognition of vocabulary in verbal and written communication, and their comprehension of vocabulary in listening and reading skills are still inadequate as a result of ineffective strategies of vocabulary learning. These research outcomes suggest that lack of utilizing learning strategies or their choice of ineffective learning strategies will lead to negative learning outcomes unless they select effective vocabulary learning strategies recommended by teachers. Therefore, vocabulary learning strategies (VLS) play a vital role in ESP and they facilitate students' vocabulary acquisition and retention process in the field of their study.

5. Pedagogic aspects on ESP vocabulary learning strategies

5.1 Umbrella terms: Direct and indirect vocabulary learning strategies

ESP students usually acquire technical and semi-technical vocabulary by both intentional and incidental learning through reading in specialized context. Many scholars including Oxford, Nation and Schmitt devised and developed the taxonomies of vocabulary learning strategies and proposed more effective approaches for learners' lexical acquisition and competence in their studies. Oxford (1990, as cited in Sadeghi, Hassani, and Hessari, 2014) classified learning strategies into two major areas, direct strategies that directly deal with the target language learning and indirect strategies that support and enhance the process of language learning. Oxford divided these two areas into six sub-groups: memory strategies, cognitive strategies, compensation strategies, metacognitive strategies, affective strategies and social strategies and these groups are extended to more sub-groups. Schmitt (1997, as cited in Jurković, 2006) further provided a more detailed account of vocabulary learning strategies into two main categories: direct strategies which involves memory, cognitive, and

compensation, and indirect strategies which are comprised of metacognitive, affective, and social strategies. Tskhvitava (2016) claims that morphological analysis of word structure is essential for a direct strategy: vocabulary used in class, and an indirect strategy: vocabulary used in independent work, of vocabulary learning. Schmitt later included determination strategies which look into the discovery of the usage and meaning of new words without another's help, and consolidation strategies which are used for consolidating the word in memory for application in the future.

Nevertheless, Segler et al. (2001, as cited in Jurković, 2006) pointed out that the taxonomies are still inadequate as they do not include concepts related to deeper analysis which entails more cognitive effort or semantic involvement that results in a more long-lasting lexical repertoire. Crucially, effective use of vocabulary learning strategies should be elicited by observation, interview, test, and survey, and teachers should determine what strategies should be applied to replace the ineffective, surface learning strategies commonly employed by learners.

5.2 Technical word list for specialized vocabulary acquisition

Building up technical vocabulary lists is an essential learning tool and a common practice in learning specialized vocabulary in each discipline and they serve ESP practitioners, material designers, and learners for pedagogical purposes. In engineering contexts, Ward (2009, as cited in Nekrasova-Beker et al., 2017) emphasized specialized vocabulary which appears in word lists should represent the domain or sub-domain of the relevant discipline such as civil engineering, chemical engineering, etc., and suit the level of target group of students. Ward's idea was supported by other researchers such as Brooks (2014) who gives a comprehensive overview of word list and offers useful insights on what and how vocabulary should be selected for the word list. Brooks claims that the word list must contain words that are representative of the target vocabulary students need to utilize for their professional purpose and selected words should occur across a range of different genres and text types in job-related contexts. Therefore, before students read a discipline-specific text, a vocabulary load analysis can be used to determine how many words and word families are needed to read a text and prepare the word lists and word family lists accordingly. Nation (2013, as cited in Coxhead & Demecheleer, 2018) suggested including a headword and its derivations.

Among the studies of word selection procedure in devising a technical word list, Nekrasova-Beker et al. (2017) stated that various types of engineering word lists comprised of individual words or word families were retrieved from discipline-specific corpora devised by ESP practitioners and researchers, and the selection criteria is based on frequency of occurrence and other lexical characteristics. A significant longitudinal study conducted by Chirobocea-Tudor (2018) highlights the importance of making word lists of technical and semi-technical vocabulary. According to the study, by the end of each semester, students had access to over 300 technical and semi-technical vocabulary and the accumulation of technical vocabulary rose to over 1,000 words after four consecutive semesters. Thus, as noted by Coxhead (2013, as cited in Chirobocea-Tudor, 2018), devising a technical word list is a helpful though daunting task for ESP learners in order to enhance their comprehension and utilization of vocabulary in discipline-specific context in their field of study. On the other hand, Hall (2012) highlighted the drawback of the word lists, arguing that they lack providing the word in varied contexts and linking to learning pronunciation. Generally, it is not supportive for fostering ESP students' lexical competence by giving merely a decontextualized word list along with meaning in first language equivalence.

5.3 Bottom-up strategies: Memorization and repetition

When students learn vocabulary, memory is significantly important to their cognitive process and they fundamentally use repetition and memorization strategies to achieve their short-term purpose such as passing exams. According to Schmitt (2000, as cited in Xhaferi, 2010) and Criado and Sanchez (2009), the lexical information acquired in learners' memory first appear in a learner's short-term memory and they are later activated and enhanced through rehearsal or repetitive practice to become permanent long-term memory. Hence, learners' vocabulary acquisition mainly involves short-term and long-term memory in cognitive processes in which acquisition, storage, expansion, retrieval and retention of new vocabulary learned occurred. For learners' vocabulary acquisition and long-term retention, there have been two contrasting views, proposed by ESP researchers. To acquire all syntactic, pragmatic, phonological, derivational, morphological, and stylistic features of specialized vocabulary in learners' lexical repertoire, Nation (2001, as cited in Akbari, 2015) and Nakata (2006, as cited in Maharaj, 2017) stressed that vocabulary acquisition needs continual repetition for effective learning. According to the study of Akbari (2017), the comprehension strategy, which involves memorizing the words on bilingual word lists through oral and written repetition, was the most frequent strategy employed by the majority of Iranian medical students. On the other hand, Lewis (1993, as cited in Jurković, 2006) proposed a lexical approach to vocabulary learning, which focuses more on contextualized learning than memorization of lexical phrases for storing vocabulary in students' long-term memory. As mentioned by Gu and Jognson (1996, as cited in Jurković, 2006, p. 26), "the shallow (also surface or mechanical) strategy of visual repetition was the strongest negative predictor of learning outcome, as opposed to deeper strategies".

5.4. Contextualized and decontextualized vocabulary learning strategies

To increase lexical storage in students' long-term memory, many scholars recommended using decontextualized vocabulary on technical word lists at the beginning level and more contextualized vocabulary learning when students' language skills increase or a combination of two strategies in vocabulary tasks and activities. On the other hand, Jurković (2006) argues that contextualized and decontextualized vocabulary learning strategies are appropriate for both highly proficient learners and less proficient learners. Therefore, learning specialized vocabulary in discipline-specific context plays a vital role when seeking meaning of new vocabulary in ESP classrooms. As Criado and Sanchez (2009, p. 863) pointed out, "the absence of any contextual and meaningful elements in the teaching-learning of vocabulary may trigger ambiguity or misunderstanding, and therefore it may lead to failure in communication".

5.5 Dictionary and translation strategies for comprehension

Using the monolingual dictionary is another vocabulary learning strategy used by many ESP learners to find out the meaning of unknown words through translation since they contain more linguistic information of vocabulary than bilingual dictionaries for seeking equivalents in their first language (L1) (Nation, 2001, as cited in Xhaferi, 2010; Tskhvitava, 2016). According to Akbari (2017), finding the equivalents of technical vocabulary in L1 through translation can be facilitated by using analogies, comparing specialized vocabulary between first language and target language to find out the similarities in spelling, pronunciation and concepts. As Chirobocea-Tudor (2018, p.178) argues, "translation as a learning technique is also very useful in ESP classes, as it helps both introduce and consolidate technical terms". Taking a similar view with Akbari, Chirobocea-Tudor also considers

translation as a tool to help students comprehend the contrasts between L1 and L2 and increase their knowledge on context-appropriate meaning and semantic relationships with other words such as synonyms during a troubleshooting session in class. The outcomes of such studies indicate that many L2 learners often have access to bilingual dictionaries owing to the complexity of the text. Xhaferi suggests that using dictionaries can make enhanced vocabulary retention; however, this practice should not be the major source of learning vocabulary, especially, the monolingual dictionaries can provide only approximate meaning whereas using bilingual dictionaries preferred by low proficiency learners who always seek the first language equivalent and use word-by-word translation to figure out the meaning. Indeed, overusing bilingual dictionaries due to a lack of ability in guessing the meaning defeats the purpose of second language acquisition.

5.6 Contextual strategies: Guessing lexical meaning from context clues

To move away from reliance on a dictionary is to utilize students' vocabulary and thinking skills to guess word meaning through contextual clues. Contextual strategies are recognized as both reading strategies and vocabulary learning strategies, and students who employ these self-regulated vocabulary learning strategies will have the ability to become successful independent learners in and outside of the classroom. Ahmad, Kasim, , and Muhammad (2018) investigated business management major students' vocabulary learning strategies in ESP courses and the results revealed that most of them utilized contextual clues strategies to figure out the meaning of new words despite inaccurate guesses made by some students who used the same strategy. Similarly, a study conducted by Akbari (2017) who examined Iranian medical students' vocabulary learning strategies showed similar findings that students' most frequently-used vocabulary learning strategies are guessing and dictionary strategies. To make successful guesses, Nation (2001, as cited in Tskhvitava, 2016) stressed the importance of students' prior knowledge which plays a crucial role in guessing. Besides employing a specific strategy, participants in the study carried out by Xhaferi (2010) used a combination of strategies in discovering the meaning of unknown words, such as determination strategies: guessing the meaning from the textual context, checking dictionaries for definition or synonym in English or L1 equivalent; comprehension strategies; transactional strategies: asking the teacher; social learning strategy: cooperating with peers, and word features analysis.

5.7. Discovery strategies: Data-driven and technology-based vocabulary learning

5.7.1 Utilizing corpora and concordance in vocabulary learning

With the merging of information technology and education technology, data-driven learning (DDL), a corpus-based approach, has been devised for effective ESP vocabulary teaching and learning. Developing corpora of subject-specific texts is incorporated into vocabulary teaching as a research and teaching tool to draw up lists of key lexical items in each discipline (Dudley-Evans & St John, 1998). In the same way, Wu (2014) and Coxhead and Demecheleer (2018) stressed that corpora language instruction plays a crucial role in developing technical word lists to decide which words from the corpus of discipline-specific written texts should be included in a word list using a selection criterion. Wu (2014) recommends corpus building for designing appropriate needs-based teaching materials, motivating students and course evaluation purposes. According to Wu, teachers and learners should build their own corpora, and concordance by selecting target words from specialized genres in domains in their field of study in order to resolve their difficulties in vocabulary learning. From a pedagogical point of view, Nekrasova-Beker et al. (2017) suggests

ESP practitioners integrate corpus-based activities into their specialized vocabulary learning and provide access to authentic discourse in specific genres in order to help learners explore the syntactic features of professional contexts. As a consequence, ESP practitioners are recommended to create various types of interactive tasks and activities to foster students' lexical acquisition and expansion through corpus-based concordances which promote discovery-based learning by supporting students to discover lexical features, syntactical features, and collocations of specialized vocabulary in authentic texts.

5.7.2 Digitized vocabulary learning strategies

Since Computer Assisted Learning (CALL) was integrated into language instruction in second language learning, ESP vocabulary learning have been developed in terms of using computer technology as a learning tool creating many applications in teaching and learning including a variety of vocabulary tasks and exercises via language learning software, CDs, Internet and various other resources. Liuliene (2013, as cited in Chirobocea-Tudor, 2018, p.179) pointed out that "the virtual medium has also become a major means of learning ESP vocabulary, favored by both learners and teachers because finding such terminology is easier on the Internet than in any printed dictionary". Many recent studies shed new light on the fact that employing technology-assisted learning strategies helps ESP learners to gain more practical knowledge and real-world experience in their specialized lexical acquisition and development. In recent years, there are many effective ways to integrate technology into the process of teaching and learning professional vocabulary both inside and outside classroom. Indeed, technology-oriented students are embracing digitized vocabulary learning by discovery which stimulates their interest and promotes their creative and critical thinking skills (Liuliene & Metiūnienė, 2013). Technology-based vocabulary learning, such as game-based learning, raises their motivation, interactivity and competitiveness in a stress-free learning atmosphere (Nguyen & Nga, 2003, as cited in Riahipour & Saba, 2012). Moreover, the Mobile Assisted Language Learning (MALL) or Mobile learning (M-learning) makes use of smart phones which is convenient, user-friendly and easily accessible for learners, and vocabulary learning applications, such as mobile dictionaries, can be downloaded on the phone for tracking, memorization, and having access to interactive tasks (Ali & Ghazali, 2016; Alizadeh, 2018). Ultimately, this digitized vocabulary learning is gradually replacing the use of textbooks, paperback dictionaries, and reliance on the teacher. Most crucially, utilizing these electronic learning tools raises learners' motivation, provides improved potentials for specialized vocabulary acquisition and enrichment, and makes them feel that they are digital learners in the ever-changing academic world.

5.8. Workplace-based vocabulary learning strategies for terminological skills

To meet learners' communicative needs, ESP pedagogy has been incorporated into most major discipline area and focuses on the real use of vocabulary for communicative purpose in the workplace. Therefore, Nation and Coxhead (2001, as cited in Hajiyeva, 2015, p. 141) suggested that "words should not be learned out of context for the purpose of the acquisition of vocabulary". Although students are given myriad opportunities to have access to authentic sources, pertaining to their discipline in technology-assisted vocabulary learning strategies, ESP practitioners have been attempting to bridge the gap between the classroom and the workplace to get their learners closer to authentic learning environments in real-world settings. In line with this purpose, Georgieva (2015, p. 12) contended that "successful learning is possible only when terms are not taught as a subject separated from the students' real world". A pressing need for lexical competence of

students in various specific domains in engineering was also highlighted in the study of McLaughlin and Parkinson (2018) who suggested that since the large amount of technical lexis is required to become a carpenter, learning technical vocabulary should be incorporated into professional workplace training courses. Their workplace-based specialized vocabulary learning on carpentry mainly focuses on the acquisition of the specialized vocabulary fostered in a practical training environment. As Belyaeva (2015) noted, bridging classroom and workplace and achieve their goal which promotes their employment opportunities as well as their personal development in their future career and workplace communication skills.

5.9. Integrated strategies for multi-dimensional vocabulary acquisition (MDVA)

Among the various vocabulary learning strategies ESP learners can be trained to employ, Maharaj (2017) opined that Multi-Dimensional Vocabulary Acquisition (MDVA) entails a thorough analysis and can have access to all aspects of the target vocabulary in an ESP course. According to Maharaj (2017), using Multi-dimensional Vocabulary (MDV) analysis will foster students' multi-dimensional vocabulary acquisition and they will subsequently have in-depth understanding of meaning and usage of specialized vocabulary. Maharaj emphasized that using a combination of vocabulary learning strategies should lead to multi-dimensional vocabulary acquisition which is not only discovering word meaning, but also gaining a full comprehension of the concept in all dimensions of the words which learners can use in both vocal and written communication for interactional and transactional needs. By using multi-dimensional vocabulary learning strategies, students can learn a new word by making use of its properties such as the word's pronunciation, its orthography, the relationship between how it is written and how it is pronounced, part of speech, morphology and analogy which is the word's phonological relationship with its first language equivalent.

6. Learner training for effective use of vocabulary learning strategies

ESP practitioners need to provide learner training which involves helping learners to find out how they should learn terminology most effectively. It is also aimed at encouraging learners to take responsibility for learning and assisting them to develop learning strategies. Crucially, it elicits learners to reflect on how they are learning discipline-specific vocabulary to increase their comprehension in professional texts and their communication skills in target situations. Jurković (2006) highlighted the fact that training learners to make them aware of the strategies they deploy is not adequate for their successful vocabulary learning; rather, they themselves should select, monitor and evaluate the strategy that meets their learning goals. Since ESP learners should be exposed to many different vocabulary learning strategies, Akbari (2015) emphasized that the learners should be trained for utilizing vocabulary learning strategies that can help students become independent learners. During the learning strategies training, Sadeghi et al. (2014) advised ESP practitioners that they should make their learning strategy instruction flexible and focus more on learners' needs and preferences for particular learning strategies.

7. Facilitating learners' vocabulary acquisition and retention process

7.1 Teacher's role as a facilitator and material developer

Brooks (2014) highlights the role of ESP practitioners to help learners find the right strategies that best suit their learning to enhance their vocabulary acquisition, retrieval, and retention through their active involvement in the learning process. As Tskhvitava (2016, as cited in Chirobocea-Tudor, 2018) mentioned, appropriate teaching materials, effective learning strategies and teacher-learner interactions promote an environment of engagement which is crucial to overcome students' learning problems and raise their motivation. In the ESP vocabulary teaching-learning process, despite a lack of utilizing vocabulary learning strategies on the learners' side, Chirobocea-Tudor (2018) has presented a balanced view that if teachers can make improvements in their pedagogical strategies and make the ESP vocabulary learning more interesting and fun, it will boost students' vocabulary acquisition and make them become autonomous learners.

7.2 Activities for maximizing learners' lexical competence

In addition to utilizing specialized vocabulary learning strategies, ESP learners' lexical and conceptual knowledge of target vocabulary should be activated and strengthened both inside and outside the classroom. A variety of vocabulary enhancement tasks and activities may include conducting simulated occupational tasks and activities in and out of the classroom, producing technical word lists and vocabulary learning portfolios by utilizing online resources, conducting a library research project in which students read the selective subject books at appropriate levels and produce a word list and make reflections on what they learned and what strategies they employed, arranging fieldtrips to workplaces or training workshops where they can learn specialized vocabulary from professionals and seek further explanations about in-depth discipline-specific lexical and conceptual knowledge of target vocabulary and their practical use in the workplace, getting students to take part in internship programs that create opportunities to learn terminology in real-world contexts and utilize them in the workplace practically.

Conclusion

As discussed in this article, advantages of learning vocabulary in ESP courses fulfill learners' immediate needs of increased comprehension in their specialized field as well as their long-term needs of employment opportunities and personal development in their future workplace. To achieve this, ESP practitioners should keep devising and developing taxonomies for discipline-specific vocabulary learning strategies which are appropriate and effective for learners in respective disciplines. Multifaceted strategies should be incorporated into technology-assisted vocabulary learning strategies, such as having access to the Internet, smart phones, software programs to raise the learners' motivation and pave the ways for self-directed learning. To fill this gap, it requires ESP practitioners' initiatives and efforts for devising and implementing needs-based ESP courses in collaboration with major stakeholders such as learners, subject lecturers, and subject specialists; designing vocabulary tasks and activities in which effective and innovative vocabulary learning strategies are embodied and enhanced; raising learners' awareness and boosting their motivation in utilizing learning strategies to meet their learning goals; seeking practical solutions to major obstacles affecting learners' specialized vocabulary acquisition and retention process; and conducting continued investigations on effectiveness of vocabulary learning strategies for learners' lexical competence as well as their generic competence.

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