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Multicultural Problem-based Learning Approaches Facilitate ESP Language Acquisition

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Abstract. This paper discusses language teaching that incorporates Problem-based Learning (PBL), which will actively engage English for Specific Purposes (ESP) learners from diverse cultural backgrounds. When English language students who are native Speakers of Other Languages (ESOL) are a portion of the learning group, it introduces an added level of complexity to the instructional design. The instructional designer is confronted with an ESP within ESOL dynamic, which becomes one of the most significant impacting variables in the learning environment. This topic will be approached utilizing examples appropriate for a variety of cultures and ESP content areas including engineering, technology and the sciences. The methods described, however, have equal value in other disciplines with unique English language components. The paper will explore use of PBL in a multi-cultural ESP situation. It is being developed with the purpose and objectives of including an overview of the key strategies for success in language acquisition focusing on ESP, and outlining exemplar programs that can actively engage learners in defined subject-matter contexts. We begin with the initial notions of PBL in ESOL, and ESP, as separate methodological arenas, and then the integration of the two (multi-cultural situation) yields the PBL of ESP within an ESOL environment.

Introduction

There is an adage in the contemporary American education community that seems most appropriate in the situation we address in this presentation. It is: "To teach them, you have to be able to reach them." In the multi-cultural ESP environment, a language teacher must confront the confounding complexities imposed by a largely ESOL student population. Reaching that student group is a challenge that is difficult enough when teaching simple conversational English.

It becomes considerably more imposing when ESP is the language being taught. As journal articles have noted, legal and medical English have an almost exclusively Latinate character, which contributes to an easier understanding and quicker grasp by those ESP students whose mother tongue is a romance language. But other ESP focus areas may not offer so easy a path. This is particularly true in the science and engineering disciplines that have emerged in the late 19th and 20th centuries. The rapid development and global deployment of these science, technology, engineering and mathematical (STEM) disciplines has led to the accumulation of new words in the English lexicon that are simply "grabbed" from the linguistic environment from which they were first observed. Thus the ESP vocabulary of these disciplines is, while not "filled", at least sprinkled with terms that need specific explanation at first usage to provide clear understanding of the term, even to the native English speaker. ESP researchers in Asian nations have noted particular difficulties in this regard in recent publications (Hoa & Mai, 2016; Liu, 2016: and Banditvilai, 2016), as will be discussed in greater detail below. The recent literature also contains methodological suggestions for increasing the effectiveness of ESP learning, which will also be highlighted (Privas-Breaute, 2016; Kleanthos and Cordozo, 2016; and Wu, 2014)

The Eclectic Character of English

Spanish and French have formal bodies that "authorize" the addition of words to their officially recognized lexicon, which insist on consistency with internal phonetic protocols for the formal inclusion of a word into the languages. German often adds words by combination of existing simpler German words into more complex structures that are then conjoined to generate a more complex word form, similar to a phrase, which expresses the meaning.

The English language is primarily Germanic and Latinate in its origins as any scan through the etymological segments of the *Oxford English Dictionary* will illustrate. But, the near global reach of the British Empire led to the early accumulation of many words in that lexicon not of European origins. This is not a new phenomenon. The word "khaki", for example, is Hindi (from Sanskrit) meaning "dust" or "dusty in appearance". It came into English during the Raj in the 18th and 19th Century to describe the tan colored cotton field uniforms issued to local troops of the British colonial army elements. It ultimately became the common term in English for any tan hard finish cotton fabric, or even pants made from such fabric.

When one begins to teach ESP, you observe these types of terms frequently, especially from science or engineering research and practice in non-European areas. Where a local population has a term that describes an observed item, phenomenon or event very specifically, that term has been incorporated directly into English. The English vocabulary of the biological sciences is literally filled with common plant and animal names used in the regions where they were first identified. Thus we find baobab and saguaro, orangutan and coatimundi in our lexicon along with violet and lily of the valley, and lion and catfish. But the phenomenon is not unique to biology. Several examples will follow to illustrate this point. This is in addition to English use of Italian,

Spanish, French or German words, as they are, without any anglification. Thus *"portico", "arroyo"*, "*creme de la creme*", and "*zeitgeist*" are in our dictionary, and common usage instead of, or in addition to, a distinct English term with the same meaning. We just grab the term, and use it rather than "create" an English word that fits the "formal structures" of the language.

To illustrate the pattern of simple inclusion of non-European origin terms described above, as relates specifically to the sciences, one need only ask from whence did the nouns "monsoon", "haboob", "monadnock", "alkali", "taiga" and "fynbos" make their way into the ESP lexicons of meteorology, geology and ecology? They are Hindi, Arabic, and a colloquial New England geographic element, Egyptian Arabic, Russian and Afrikaans, respectively. It is easy to see from these examples that a glossary at least, or a dictionary at best, is an essential tool in any teaching of the ESP for the newer parts of the science realm.

So long as the terms in question are nouns, the situation is relatively manageable, with a good glossary, without any etymological components required. When we begin to incorporate English words that have identical spelling for their noun and verb forms, or where the past tense of a verb is also used as an adjective, for example, the situation becomes far more complicated. Two examples come immediately to mind. The first is "structure". As a verb it means "to construct", "to build" or "to arrange". As a noun it means "an object that is built or constructed". The past tense of the verb, "structured" can also be employed as an adjective, as in "a structured vocabulary". A far more complex example is the word "stuff". As a verb it means "to fill, frequently to capacity or beyond". As a noun, it is a plural collective, referring to any assemblage of items, without specific description. To further complicate the usage of "stuff", the past tense of the verb, "stuffed" is also used, at least colloquially, as an adjective, frequently in cooking terms, to imply an object with a cavity that is filled with other material, as in a "stuffed goose".

Thus we see that the eclectic, complex character of English makes it more difficult for the conversational ESOL learner, and the specialized ESP learner in the Sciences is frequently, confronted with vocabulary not of traditional Germanic or Latinate origins, adding to that difficulty. Addressing these issues requires a very carefully planned approach where problem-based learning methodologies can be employed to overcome these inherent complexities of contemporary English, particularly within the science, technology, engineering and mathematics (STEM) environments.

Problem-based Learning (PBL), an Explanation

PBL has its origins in medical education in Canada, and thus has roots in a discipline where ESP is an integral part of the educational process. It quickly attracted attention and usage in the English-speaking medical education community, and from there spread into post-secondary settings in the United States and other Anglo-phone nations. Problem-Based Learning is a flourishing approach to learning that is extremely useful in promoting critical and analytical thinking, and in addressing the rapid technological changes and dynamic workplace of the 21st Century (Nicolaides, 2012). PBL is founded on an unconventional pedagogical model when viewed alongside the conventional

didactic one and it offers greater benefits to the quality of student learning (Greening, 1998). The similarities to the case study methodologies employed in the business education community were also quickly recognized. The advantages of PBL over the case method were quickly recognized, since the frequently complex case development process could be avoided by focusing on an unstructured problem in the abstract, without the need of the detailed background, setting and circumstance development that cases involve. This is also the case relating to the science field and further attention is being devoted to exploring active learning methodologies for language learners in the scientific curriculum (Caspary & Boothe, 2016).

Problem-based learning is defined as "an approach that challenges students to learn through engagement in a real problem. It is a format that simultaneously develops both problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem-solvers confronted with an ill-structured situation that simulates the kind of problems they are likely to face in complex professional circumstances" (Stover, 1998). Gvardjancic notes (2001) "PBL emphasizes the learning part of the teaching-learning process. It is based on the idea that learners learn what is meaningful to them and learn better if they feel in control of what they are learning." "The philosophy behind Problem-based learning is that knowledge and skills are acquired through a progressive sequence of contextual problems, together with learning materials and the support of the instructor" (eLearning Industry, 2014).

PBL is not new. Stepien and Gallagher suggest that, "it has been a major success since the 1970s. PBL turns the instructional setting topsy-turvy, shifting the learning environment from a teacher centered to a learner centered one. In the place of covering the curriculum, learners probe deeply into issues searching for connections, grappling with complexity, and using knowledge to fashion solutions" (Stepien & Gallagher, 1993). Yew and Goh (2016) focus on the process and impact on learning provided by Problem-based learning, and examine its effectiveness concluding that "studies comparing the relative effectiveness of PBL are generally consistent in demonstrating its superior efficacy for longer-term knowledge retention."According to Stover (1998) PBL "will increase retention of knowledge, help students transfer concepts to new problems, enhance students' interest in the content and enhance self-directed learning".

Realistic problems are the key to the use of the PBL model. But what are the characteristics of good problems? Duch (1996) lists some of the characteristics of good problems as:

1. "An effective problem must first engage students' interest and motivate them to probe for deeper understanding of the concepts being introduced.

2. Good problems require students to make decisions or judgments based on facts, logic and/or rationalization.

3. Cooperation from all members of the student group is necessary in order to work effectively through a good problem.

4. The initial questions in the problem should have one or more of the following characteristics; they should be:

open-ended
connected to previously learned knowledge
controversial issues that will elicit divers opinions.

5. The content objectives of the course should be incorporated into the problems, connecting previous knowledge to new concepts and connecting new knowledge to concepts in other courses and/or disciplines."

Ron Purser (2010), a faculty member in the graduate management program at the San Francisco State University notes,
"Problem-based learning is student-centered. PBL makes a fundamental shift--from a focus on teaching to a focus on learning. The process is aimed at using the power of authentic problem solving to engage students and enhance their learning and motivation." There are several unique aspects that define the PBL approach:

1. "Learning takes place within the contexts of authentic tasks, issues, and problems--that are aligned with real-world concerns.
2. In a PBL course, students and the instructor become co-learners, co-planners, co-producers, and co-evaluators as they design, implement, and continually refine their curricula.
3. The PBL approach is grounded in solid academic research on learning and on the best practices that promote it. This approach stimulates students to take responsibility for their own learning, since there are few lectures, no structured sequence of assigned readings, and so on.
4. PBL is unique in that it fosters collaboration among students, stresses the development of problem solving skills within the context of professional practice, promotes effective reasoning and self-directed learning, and is aimed at increasing motivation for life-long learning."

PBL is a multilevel approach to learning that incorporates relevance and complexity while strengthening critical and analytical thinking, and provides an opportunity for self-assessment and continuous improvement. PBL guides exploration, and students who learn using this model develop a sense of self-esteem and ownership for their work. Through the use of this model, opportunities abound for linguistic development coupled with acquisition of content area knowledge. Scott (2014) focuses on a multilevel analysis of Problem-based learning design characteristics and "proposes and tests a multilevel of PBL design characteristics reporting findings that reinforce the importance of problem design characteristics and effective team facilitation while raising new questions about team-level characteristics."

The key to the success of English language acquisition through PBL is to utilize selected constructive problems purposefully designed to address the desired learning outcomes. These problems are often influenced by social and contextual factors. Most students already possess conceptual knowledge in their native language. Cummins (2000) states: "Conceptual knowledge developed in

one language helps to make input in the other language comprehensible." Careful lesson planning is necessary in terms of language learning and content knowledge. When using the PBL model, content is introduced in the context of real world problems. The learners' acquisition of knowledge is achieved through a combination of learning strategies that are self-directed, independent, and collaborative, while also emphasizing communication skills and providing ongoing reinforcement.

Although the sources of problems and the contexts for their classroom use may vary, PBL has common features: problems should engage students' interest and motivate learning, require students to develop a line of reasoning that is backed by evidence, be complex enough to motivate participation of a group of students rather than just a single individual, be open-ended enough at the outset to allow participation by all students, incorporate the learning objectives of the course, and allow for many legitimate paths to a single resolution (Duch, 1996).

Problem-based Learning in an ESOL Environment

Kosel (2002) points out that use of PBL is relatively new in the field of language teaching and learning. According to Gvarsjancic (2001), the teaching approach was introduced with the desire to integrate language and content study to facilitate autonomous learning. He contends that the idea to use PBL in language learning was developed by a Leonardo da Vinci pilot project for the year 1999/2000 entitled Teaching English for Technical Purposes—TENTEC.

Gvardjancic (2001) says the following about the results:

> "The results of the project showed that was especially appropriate for teaching languages across the curriculum for some reason. Firstly, there is the question of motivation. ESP teachers sometimes find it difficult to motivate their technically or professionally oriented students for language learning. Even carefully designed curricula, which follow needs analysis, do not always meet the real interests of young student population. Updated textbooks soon become boring and obsolete since new information is easily accessible on the internet. So, a real-life problem raises motivation. Secondly, and closely connected with the question of motivation, is the significance of teaching languages across the curriculum. Languages at tertiary level are often treated as second-rate subjects. This situation is reflected in students' attitude towards language as a faculty subject which they consider a necessary evil but not linked to what they believe to be their genuine study program. This situation can be changed. Working closely with "subject teachers", language specialist becomes involved with the faculty programmes, while the students feel they can combine their professional knowledge and their knowledge of language".

Kosel (2002) enumerates the following as some of the advantages of PBL approach in teaching English across the curriculum:

1. "A real problem raises motivation, much more than a preselected sequence of information from a course book.

2. In the model, students can integrate their professional knowledge and their knowledge of English.

3. The model makes them better equipped with functional skills needed for their professional careers and thus makes them more competitive on the job market.

4. Individual and social learning are combined.

5. English is learnt while doing something else, which goes together with the slogan "Learn by Doing."

Problem-based learning can be used to actively engage learners and bridge the gap between English language learners and their subject matter. Methodology rooted in inquiry can be particularly effective for teaching science and mathematics (Stoddart et al., 2002), and can enhance comprehension for primary grade learners up through the specialized focus of higher education coursework. In PBL, students are asked to apply a newly acquired skill set to a real life problem, where the students are the active centers of learning and the instructors serve as the facilitators. This educational model can help to communicate relevance in science and engineering disciplines which are plagued with a stigma that dictates these subjects should be difficult and daunting. The PBL paradigm asks students to take on an active role in their education, where the learning becomes everyone's responsibility.

In Polanyi's (1966) definitions of explicit and tacit learning, explicit knowledge is defined as transmittable by formal, systematic language and tacit learning refers to knowledge attained through action. For students struggling with language acquisition, tacit learning, which is grounded in experimentation and experience, is the optimal mode for gaining expertise in a given subject. It is recognized that current educational policies and practices do not support desired outcomes with English language learners (Lee, 2005). By providing students with an inquiry-based approach for solving real-world problems, students working hard to gain proficiency in English speaking and literacy can gain understanding in a discipline through performance. "When students are driving the problem posing and decision making, it has been found that these inquiry-based methods personalize the project, increase relevance, and create ownership" (Johnson and Kean, 1992). The following illustrations from the world of praxis are good examples.

At the elementary school level, PBL was used in the creation of an outdoor classroom in Athens, Georgia. Students were charged with the task of creating a flexible outdoor classroom space. The students were asked to participate in every part of the implementation process, from brainstorming the design, through the execution of the project, and finally with the development of a curriculum around the conceived environment. A range of kindergarten through fifth grade students were taken to the proposed outdoor classroom site

and then asked to imagine their ideal outdoor learning environment. They had the opportunity to illustrate these thoughts and share them with a Master's of Landscape Architecture student at the University of Georgia. The graduate student then took the student designs and compiled their ideas into a conceptual plan. The students assisted in the grading and planting of the site, as well as engineering a rain garden with French drains, a bog, a brick pathway, and retaining walls. The planting and installation of over 40 different native perennial plant species ensured a botanical wealth of learning opportunities for future classroom participants. The service-learning component of the project provided equitable learning opportunities where language barriers could be crossed through student collaboration toward a common goal.

This creation of the outdoor classroom required elementary students to make a personal investment in their education and into the project, where they were more likely to use their support network of parents, teachers, friends and the community to help them meet the goals of the project. English language learners who participated in the project were given a cooperative learning environment to strengthen peer relationships. The hands-on nature of the project created a sense of ownership among project participants and catered to a wide range of skill and ability levels. The problem-based approach took the focus out of the lecture-based classroom and into an environment where learning involved doing, and ESOL students experienced a rich opportunity to develop specialized language skills in an applied setting.

In an example from higher education, master's students in the College of Environment and Design at the University of Georgia assisted in the creation of a master plan for the State Botanical Garden of Georgia. These students brought together skills from the fields of geography, archeology, architecture, art, horticulture, and plant biology and worked as a dynamic and collaborative whole toward addressing the infrastructure problems of an entire institution and anticipating future needs of the facilities. English language learners in the group found themselves on equitable footing with other members of the group. Any language challenges students faced were resolved through the give and take of peer interaction, where shortcomings in one area were matched with a display of skill in other areas. The students were called on to demonstrate their proficiency with technology through the use of mapping software, their skill in design, and a competency at representing the conceptual plan in presentations to garden staff. These project requirements all reinforced specialized language acquisition for English language learners without drawing unwanted attention to individual deficiency or necessitating abstract language acquisition techniques. Instead of being allowed to go unattended in a classroom instructional setting, each student's needs were addressed in the light of achieving a common goal.

A new program aimed at improving international student performance is now being offered to students at one United States university. Golden Gate University (GGU) in San Francisco, California, is offering a specialized English language program. The GGU Preparation in Language and University Studies (PLUS) program has been designed specifically for ESOL students, who have limited speaking and writing skills, to participate in a collaborative process to improve their English proficiency. GGU has a large Asian international student population, with students from Mongolia, South Korea, Japan, China and

Taiwan, needing to increase their proficiency in written and spoken English. PLUS is designed to encourage students to work in collaborative sessions, geared to solving common problems associated with the business curriculum, in which most students are enrolled. The program has a remarkably high 80-85% success rate as reported by Karin Fischer (2011) in her Chronicle of Higher Education article on PLUS.

Focus on STEM ESP

As noted above, the eclectic character of English has added numerous words to the lexicon with origins remote from the language's Western European roots. This phenomenon is evident throughout the language, and has been of particular impact in the sciences, technology, engineering and mathematics (STEM) communities, as they become increasingly global in character, and have begun to rely upon English as a common medium of information exchange. The teaching of English as a "foreign language" has reached global proportions, with special schools teaching ESOL appearing literally in every corner of the planet. The demand for teachers of ESOL has increased dramatically at the same time.

What has become increasingly evident is that traditionally trained ESOL teachers may not be able to fully prepare non-English speakers in the STEM fields. This issue has been commented upon as applies to engineering students in Saudi Arabia (Alqahtani, 2015, p93), Taiwan (Wu, 2014, p122), and Viet Nam (Hoa and Mai, 2016, p155), and may be generalized as particularly true in Asian countries, where vocabulary issues and passive learning styles impede ESOL learning situations. Boothe and Vaughn (2011) note that, often, lecture in STEM fields is difficult for English language learners to follow coherently. They become lost in the dialogue that may be too fast paced for them, and thus have little opportunity for reinforcement of language skills. This is at least partially explained by the increasing use of specialized, discipline specific, vocabularies within the various fields. In addition, the traditional language teaching methods have proven to be less than effective in these fields because of the need to successfully build student facility in these specialized English vocabularies. Contemporary researchers have proposed numerous methods to overcome these problems. These include the avatar/spect-actor process proposed by Privas-Beaute (2016, p40-52), corpus building as proposed by Wu (2014, p120-127), blended learning as proposed by Banditvilai (2016, p220-229) and collaborative vocabulary building through blogging as outlined by Kleanthos and Cordozo (2016, p225-229), among others. It is our proposal that the use of PBL methodologies, as outlined above, and especially those proven to have positive impact in other ESOL arenas, may be of particular utility in building ESP proficiency among non-English speakers within the STEM communities.

Integration: PBL of ESP within an ESOL environment, Why and how?

The authors contend that it is crucial for PBL to be infused throughout ESP strategies and learning activities. Teamwork and collaboration are the keys to the majority of workplace endeavors and professionals are being challenged to inspire original and critical thinking. Innovation and creativity thrive among settings where employees and learners in other venues can move forward and

achieve in their area of expertise supported by ESP achievement that fits the task at hand. As English language skills and communication improves, the tools and support are in place for impressive outcomes.

Krashen (1981) advocates the use of a natural approach to strengthen new language acquisition. PBL supports his research and surpasses traditional language acquisition methodologies. Students are required to make connections as group communication is strengthened. By applying language skills to the workplace, students develop survival skills for the working environment, increase their workforce marketability, and prepare themselves for lifelong learning.

The PBL model ensures that language skills are strengthened by experience with a broader scope of disciplines at the same time. "Collaboration and hands-on learning will lower the affective filters that Krashen cautions will deter students from successful language learning." By combining language with new professional content knowledge using PBL, language skills are reinforced through group dynamics, workplace reality, and content area knowledge. Language learning and logical thinking are linked to future endeavors and the students' fields of work.

Flexibility and improvement of quality and achievement will be realized when an opportunity to incorporate ESP learning and instruction is supported through proven reinforcement activities that actively engage participants. There is a significant need to strengthen English language skills, recalibrate expectations, and better position native English speakers and professionals who are employed in English language settings. Expertise in their discipline is greatly appreciated, yet the greatest positive impact is realized when ESP is successfully coupled with performance in their occupation. The result is a significant shift in workplace expectations and needs. PBL makes the adjustments to collaborative and innovative activities more workable. English language learning, solutions to problems, and innovative advancements are realized simultaneously. Coupling strong subject matter and language learning strategies eliminates disconnects between content knowledge advancements in the workplace and English language competency challenges. The greatest positive impact in both areas is apparent as long as PBL activities are properly aligned to the learner's occupation.

On the assessment side, gains will be evident and incremental successes will be enhanced, not just one time, but in an on-going and increasing basis throughout the process as we seek solutions for balancing and restructuring ESP and workplace endeavors. Specific experiences with PBL (Kaufman, et al, 1989) and meta-analyses of outcomes (Albanese and Mitchell, 1993) from PBL curricula in the medical school context have shown that content learning in PBL matches that in a traditional curriculum. Additional outcomes in PBL include greater retention of knowledge and greater satisfaction with the educational experience.

When language accommodations are no longer required, additional time and energy will be available for implementation of greater workplace skills requirements. A program combining PBL and ESP strives to strengthen accomplishments of employers and employees alike, and enhances strong teamwork with an emphasis on creativity and innovation. As professionals are

walking down the situational paths relevant to the environment in which they work, they can acquire new knowledge and language proficiency simultaneously. Employing PBL and ESP strategies that change the context in which we reach educational and occupational investments will result in significant accomplishments and gains in both areas.

Examples from the International Community

Globally, examples abound of the employment of PBL methodologies to increase ESP facility. The country of Korea is rapidly adapting PBL to the field of ESP in the information age. They are striving to challenge competitors and are promoting improvement of educational quality and enhancement of accessibility using PBL in the workplace, cyber-culture, and the English language classroom. At universities and in corporate business settings, English is becoming the key to advancement, rising in importance over seniority and subject area/discipline specific education.

For example, securing a position as a flight attendant is a highly competitive and coveted accomplishment. Recruitment events draw hundreds of applicants. English skills and a university education are required along with grooming and excellent social skills. In fact, academies called *hagwons* are springing up to prepare aspiring applicants and provide PBL opportunities with a strong focus on ESP.

There is an abundance of math and science majors in Korea who are interested in securing teaching positions in the public schools. Teaching is a respected occupation in Korea and jobs are highly competitive. One reason for this is that there is a high level of job security until the mandatory retirement age of 65, and teachers receive tenure during their first year on the job. However, English competence is in significant need, and although coursework is offered, excellent English teachers with clear pronunciation and speaking competence are not available in the quantities necessary to meet the need. As a result, English courses are often taught by Korean professors who are limited in their English acquisition because they, too, were taught by Korean professors who do not have optimum English language competency. It is interesting to note that exchange programs are growing that focus on bringing Korean teachers to the United States to accept difficult to fill math and science positions. This requires at least two years in English language pre-service preparation at US universities in order to meet the qualifications of both content and pedagogy. The necessary government visas need to be obtained to ensure that this is successful. A large part of the pre-professional training will focus on PBL and activities appropriate for the classroom setting. It is also worthy of note that private instruction in English, taught by native English speakers, is in high demand, and teachers for such programs are being continuously recruited in England, Canada, the United States, Australia and New Zealand.

In Italy and Germany, ESP is a crucial area and numerous ESP programs and conferences are available. Often PBL sessions are held at the workplace. For example, corporations such as Hewlett Packard have sites in both countries and offer mandatory PBL training sessions in English related to the specific qualifications and responsibilities of an employee's position.

Conclusions and Recommendations

We suggest that the examples above illustrate that use of problem-based learning tools have much to offer in the teaching of English for Specific Purposes. This is particularly true in the case of the STEM disciplines which have emerged to full development and proliferation in the 20th Century and expand in importance in the 21st. One conclusion we reach in this regard is that the problem definition, and then systematic solution seeking emphasis of these disciplines lend themselves uniquely to the PBL approach to learning the unique English of the fields, and that the scholars and practitioners in these fields will be the ultimate beneficiaries.

Several of the authors referenced have noted that there are attitudinal and learning style issues that impede effective ESP learning. They have noted:

- indifference to use of English, in spite of globalization of disciplinary communications;
- vocabulary weakness with little interest in building term knowledge to a critical mass associated with effective written or verbal exchanges within a professional setting;
- student passivity in academic settings that reflects cultural reluctance to confront authority figures, even in the face pressures to adapt;
- and, conversational pace inhibiting clear understanding of both theoretical and practical considerations. It is our conclusion and suggestion that the use of a problem-based approach in ESP learning situations, especially those in STEM fields, will help to overcome these obstacles to learning, and contribute to greater facility in English by the learner, within and without the area of specific emphasis.

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