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Implementing Problem-Based Learning to Enhance Problem Solving Skills and Intercultural Competence in ESP Course: The Case of English for Food Science and Technology

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ABSTRACT: *Higher education institutions are currently deemed as the prime catalysts in developing a set of skills required for producing graduates seeking to realize vocational goals. Problem solving is set among the number one of these skills. The aim of this paper is to implement problem-based instruction in ESP syllabus through the consideration of problem solving and culture as its main principles. The work purports to investigate the effects of PBL in enhancing the students' problem-solving skills as well as their intercultural competence through the students' lens. The case study method is adopted to achieve the determined purpose by providing a detailed lesson plan through stating the course objectives, the teaching scenario, assessment and the teachers and students' roles. In assessing the students' attitudes towards the effectiveness of PBL in the current ESP course, a survey was conducted with 40 students enrolled in Master studies at the institute of Nutrition Food and Agro-food technologies, Constantine 1 University- Algeria. The results confirm the students' positive attitude towards PBL in the current ESP course in enhancing their problem-solving skills as well as in boosting their intercultural competence. These results would, hence, recommend the consideration of PBL approach and the integration of culture as an educational goal in ESP instruction.*

KEYWORDS: ESP; Problem Based Instruction; PBL; Intercultural Competence; Problem Solving.

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Introduction

Enabling the learners to think critically, solve problems and make decisions has become an eminent concern in 21st century pedagogy. The latter cognitive skills are now sought from the labor market to be traits of university students. "Work is no longer defined by your specialty; it is defined by the task or problem you and your team are trying to solve or the end goal you want to accomplish" (Wagner, 2008). To attain such goals, higher education institutions call upon stimulating a myriad of "soft"(e.g. personal and interpersonal skills) and "hard" skills (e.g. problem solving, technical skills) (Tuzlukova & Singh, 2018). These skills are also referred to as 21st century skills (Binkley, Erstad, Herman, Raizen, Ripley & Rumble, 2010), and they involve communication, collaboration, critical thinking and creativity. Critical thinking and problem solving are set among the prime to-be-promoted skills in higher education by many language experts (e.g. Masduqi, 2011; Hirose, 1992) for preparing university students to be effective future professionals.

The accelerating technological progress the world has witnessed in the last decades and the widespread of English as a global language have made the world a small village and have, accordingly, increased the challenge to cope with the rather fast changes. University students are urged not only to develop cognitive skills but also language competencies that would allow them to achieve successful international communication. ESP has been designed for this purpose. Since its emergence, ESP has been integrated at different levels of the educational system to develop language skills for occupational and educational purposes. Nevertheless, ESP contemporary approaches, conjointly with higher education, have directed attention to the promotion of a set of soft and hard skills in addition to language skills (e.g. Tuzlukova & Singh, 2018;

In addition to enhancing cognitive capabilities, the issue of culture has started to gain increasing interest in ESP education. Culture, and more specifically, intercultural aspects have captured more attention recently as one of the major targets of ESP is to make learners capable to establish successful international communication with people from different cultures using English as a means of communication. Intercultural competence is, therefore, another noteworthy issue to be tackled in the current ESP course. Despite its importance in foreign language teaching, the teaching of English for specific purposes "has typically been seen as divorced from cultural input". (Kavalir, 2013). ESP instruction often relies on needs analysis for syllabus design rather than catering the issue of culture. The reason might be attributed to a variety of factors: the textbooks do not incorporate culture and do not consider it as a learning goal (Bocanegra-Valle, 2015). ESP teachers need to be trained on how to develop their students' intercultural competence as they have obstacles in doing so; this urges them to adopt much more culture-free instruction that focus on accuracy and vocabulary acquisition (Byram, 2014). It is an axiomatic fact that vocabulary acquisition is better achieved through authentic texts reflecting the foreign language culture.

1. Aim of the study

The aim of the present work is twofold:

- First, to address the course of ESP for science and technology from the cognitive perspective through the implementation of PBL as an educational target and, accordingly, investigating the students' attitudes towards the application of this approach in enhancing their problem-solving skills.
- Second, to tackle the issue of culture and how it is incorporated in the course and, then, to assess the students' perceptions of the concept of interculturality and whether the current ESP course boosts their intercultural competence.

2. Research questions

The research attempts to answer the following questions:

1. How is problem-based instruction addressed in the different stages of the current ESP course?
2. What are the students' attitudes towards the current ESP course in developing their problem-solving skills?
3. How is culture integrated in the course? Does it increase the students' intercultural awareness?

3. Significance of the study

The current work is an attempt to introduce problem-based education and interculturality in ESP in the Algerian university. PBL is considered an innovative approach to teaching ESP as it goes beyond traditional ESP practices that are mainly concerned with mere teaching of language rules, vocabulary terminology and translation. Rather, it stimulates learning specialized English through solving real life problems. This way of learning by doing is considered motivating to the students and would, therefore, ensure their long-term retention. Tackling the issue of interculturality in the current ESP course would also prepare the students to interact internationally with people from different cultures. Having gone through the literature on ESP studies conducted in Algeria, this has been the first investigation so far that assembles cognitive and social skills in ESP instruction.

The study provides an overview of the issue of PBL as a goal-directed learning and its implementation in ESP syllabus. It reviews past research on fostering intercultural competence in ESP education. Then, the study spotlights these two key issues in the different facets of the current ESP course. Special attention is paid to the case study method. The different stages of ESP syllabus are described, problem solving and culture integration, which are considered as the underpinning principles of the current ESP instruction, are illustrated in the variety of the course tasks. As ESP teaching is self-directed, the teacher's and the students' roles are pertinent to note. Then empirical data are offered through investigating the students' attitudes towards stimulating their problem-solving skills and their intercultural competence in the course.

4. Literature review

4.1.ESP in higher education

The widespread of English as a global language in recent decades has increased its popularity to be taught as a foreign language in most higher education institutions worldwide. University students are urged to achieve competence in this language for academic or occupational purposes. To satisfy this target, teaching English has shifted from general communication purposes to specific purposes, leading to the emergence of ESP as an independent branch in the 1960s to satisfy different needs like English for economics, English for medicines, English for science and technology and so forth (Elmechta, 2020).
In the Algerian context, ESP has been taught in the different educational levels at the university (Fehaima, 2022). In spite of being a compulsory course at the university, diverse limitations towards teaching it are raised. For example, most teachers of ESP are not ESP practitioners; they teach academic English, which might not go with the students' interest. In the same vein, ESP is not given much attention as the time allocated for this course does not exceed 30 hours in the whole semester. Add to this, English is taught exclusively for one semester in the three years of Bachelor degree and once in Master degree. Furthermore, as the majority of ESP teachers are not specialists, teacher training is considered paramount, yet it is non-existent at the Algerian university. (Elmechta, 2023)

To get over the limitations traditional ESP practices have brought, contemporary theories have turned attention to a set of skills in addition to linguistic skills. Problem solving, communication, decision making and cultural awareness are set among the basic skills ESP instruction need to trigger (Medvedeva,2003

cited in Tuzlukova & Singh, 2018). An effective ESP instruction should go beyond the teaching of content and language and should immerse students in a real life learning environment that stimulates problem solving skills and the transfer of acquired knowledge for future academic or professional life(Basturkmen, 2006).

The aforementioned skills, if prompted, would lead to self-directed learning. The latter refers to the process "in which individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning goals and objectives" (Tuzlukova & Singh, 2018, p. 417). The role of ESP instructors is not to provide knowledge, as it is readily abundant by all means, instead they ought to ensure collaboration inside the classroom by training the students how to find information, interpret it and utilize it. This could be best triggered through setting problem solving as an instructional tool.

4.2.Problem based instruction (PBL)

Problem based instruction is a cognitive and metacognitive approach to English Language Teaching (ELT) (Salleh et al., 2018). This approach was first adopted in medical education in the 1960s to expand to other fields of learning (Gillian & Elizabeth, 2003). Regarding language learning, this approach was only introduced in the 21st century to be considered one of the latest approaches **(**Hassan, Alzahrani.& Naz, 2023*)***.** PBL is a curriculum design methodology that is often used in higher education (Savery & Duffy, 1995). It engages students in learning how they learn a language. To put this in other words, language learners are not presented with language rules to practice, albeit they learn it through using it. Students work alone or in groups first to understand a particular problem and then to find possible solutions to it. (Sellah et al., 2018)

A comprehensive definition is provided by Woods, Hall, Eyles, and Hrymak [in Lytovchenko et al., 2022) who emphasize that"In PBL, the problem drives the learning. Instead of lecturing, we give the students a problem to solve. For that problem, small groups of students identify what they know already and what they need to know, set learning goals,and make learning contracts with the group members". (p. 905).

In PBL, the session starts by challenging open-ended problems where no definite answer could be provided. The students work autonomously in groups to find answers to the given problem through previously acquired knowledge. The following are the steps they should go through when solving the problem: find out and define the problem; explore what they already know about related issues; determine what they need to learn to solve it, evaluate possible ways to solve it; and report their findings (Willis,1996). The teacher is just a facilitator and guide, he provides an appropriate learning environment, gives instant feedback, and evaluates the students' interactions and the final tasks. All these roles assist the students to develop their problem-solving skills. The students can be provided with constant checklists to evaluate their weaknesses and strengths as well their accomplishment of their learning goals. This permits to increase their autonomy and self-directed learning.

PBL is a beneficial approach to teach the foreign language as it makes the learners work actively and collaboratively through discussing a problem, proposing answers, making debates, reviewing the instructed knowledge, etc. It, accordingly, develops a set of skills like critical and analytical thinking, problem solving, research and social skills. It, accordingly, makes learning beneficial, promotes the learners' autonomy and encourages self-directed learning and increases the students' motivation to learn the language in a

meaningful environment through challenging problem solving tasks. It also encourages classroom interaction. (Salleh et al., 2018).

This approach is similar to other approaches to language learning such as task-based learning (Ellis, 2003; Skehan, 1998), content-based learning (Garner & Borg, 2005; Rodgers, 2006), and project-based learning (Alan & Stoller, 2005; Lee, 2002). These approaches are holistically learner-centered. Albeit, PBL central concern is learning a language through solving real, open-ended problems with no definite solutions (Ertmer, Lehman, Park, Cramer, & Grove, 2003). Dolmans et al., (2005) underlie three fundamental principles of PBL: problem as stimulus, teacher as a facilitator and group work as a strategy. Tuzlukova & Singh (2018) identified four core principles: collaborative learning, i.e. the students work collaboratively; constructive learning, i.e. they contrast prior knowledge to solve the problem (schemata); contextual learning, i.e. they link learning with the real world to make it meaningful; and self-directed learning in that the students take the initiative to reveal their needs, underlie their learning goals, select the learning materials and accomplish their learning objectives.

The inadequacy of teaching students language and content in ESP classes and the need of these students to be taught how they manipulate and apply them in real life situations and to transfer the acquired skills in the future professional or academic life makes PBL a fundamental aspect.:

> *ESP classes need to adapt and develop new ways of teaching and learning that reflect a changing world. The purpose of language teaching in ESP classes …. should be organized and structured in a way to get students prepared for successful future at the university and at work, and equip them with 21century skills, regarded as the most important by university professors and employers. (*Tuzlukova & Singhn 2018, p. 421)

PBL can provide effective ESP classroom environment by exposing the students to real world problems where they can operate their acquired knowledge, activate higher order thinking, i.e. application of knowledge, analyzing it, transferring it to new situations and evaluating conclusions(Bloom, Engelhart, Furst, Hill & Krathwohl, 1956), and work cooperatively to effectively solve problems. As far as the teaching materials are concerned, the students can deploy either tasks assigned by the instructor or online tasks that carry a problem. In PBL context, these stakeholders focus on practicing the four language skills, acquire new presented vocabulary in relation to the problem situation and practice diversified language structures in relation to ESP. An example of the verbs they use when acquiring vocabulary while solving problems are: choose, define, analyze, compare, apply, combine, contrast, classify, conclude, identify, order, deduce, judge, justify, solve, etc. ((Tuzlukova & Singh, 2018)

Teachers are no more lecturers as information is highly widespread by all means nowadays, students can teach themselves by themselves. Accordingly, ESP instructors should exploit the classroom opportunity to train the students how to find information and how to transfer it in real world contexts. Therefore, ESP education is more than learning technical linguistic terms; it is also learning how to use English in a particular context with the implication of the needed skills and objectives of language learning (Kurmanayeva et al., 2021)

4.3.Culture and Intercultural communicative competence in ESP

4.3.1. Definition of culture

When dealing with the component of culture in ELT, two definitions are distinguished. According to Kramsch (1998), the first meaning is the way a group of people represents itself through works of art,

literature, social institutions or artifacts of their daily life. The second meaning is that it refers the attitudes and beliefs as well as ways of thinking and behaviour shared by specific members of the community. Another definition is highlighted by another group of scholars cf. (e.g. Stern 1992; Strevens 1977) who distinguished between culture with a big C and the other with a little c., referring to the former as achievement culture, i.e. history, geography, institutions, literature, art and music, and to the latter as behaviour culture, i.e. behaviours, beliefs and perceptions. One more distinction is "the source culture" and the "target culture" (Byram, 1997), while the former refers to the learners' own cultural background, in this case the Algerian culture including food practices, social behaviours, etc, the latter is related to the culture of the language being learned. It is noteworthy that in the context of English as a global language, the 'target culture' is broader and may encompass any culture where English is used as a lingua franca, e.g. international cooperations, conferences, etc. Our central concern in this paper is the latter concept or culture with small "c". The issue of "culture" is significant in ESP classes, especially when presenting new specialized vocabulary. Therefore, the pedagogical target is not replacing the source with the target culture, but to put the learner in the 'third position' or as referred to by Kramsch (1993) as 'intercultural space', where they can compare and contrast their source culture with the target cultures, which deepens their understanding of both and , hence, enhances their intercultural competence.

4.3.2. Intercultural communicative competence in ESP

Intercultural Competence refers to the required capacity to "perform effectively and appropriately when maintaining communication with others who are linguistically and culturally different from oneself" (Fantini & Tirmizi, 2006, p. 12).

A plethora of studies identified three major components for intercultural competences: Attitudes, Skills (behaviour), and Knowledge (Deardoff, 2009); intercultural awareness is an example of the two first components attitudes and knowledge.

Despite its pivotal role in foreign language teaching, ESP teaching has "has typically been seen as divorced from cultural input". **(**Kavalir, 2013**)**. For decades, ESP was, to a certain extent, discerned as "free of culture". ESP teaching was expected to place emphasis on the study of language structures and vocabulary, distinct from cultural aspects (Strevens 1977). There has been a concerted effort to prioritize the analysis of the learners' needs and the subsequent design of corresponding syllabi. The issue of needs analysis and ESP course design and evaluation have been spotlighted in previous works (Elmechta, 2023a &b)

Bower (1992,pp. 29-30) claims that English for ESP as "essentially acultural". "Contents conveyed by language, but separate from language" (Penz 2001, p. 103). ESP educators tend to put focus solely on content instruction, isolated from language development or the other way around. It is until the 1970s that teaching intercultural communication awareness has been assimilated in ESP classroom after the recognition of its necessity in multicultural work environments. Language was deemed to be inseparable from culture and that teachers "cannot be teachers of language without being teachers of culture – or vice versa" (Byram & Morgan, 1994). Notwithstanding its significance, it has remained relatively marginal (Roberts 1998, p.119). One way to promote communicative competence is to foster language as well as cultural awareness.

Incorporating culture into an ESP course would influence greatly the students' intercultural competence and would facilitate their proficiency in cross-cultural interpersonal interactions. Foreign language students should be open to foreign cultures and should stimulate awareness of cultural differences (Seelye 1997, p. 207). ESP classroom has, henceforth, become "small international spaces where local

students' intercultural skills can be developed" (Aguilar, 2018, p. 25) and that intercultural competence should be regarded as an educational objective in ESP classrooms.

Numerous intercultural studies have highlighted the role of culture in foreign language learning (e.g. CLIL by Cummins, 2000; Coyle's 4Cs framework for CLIL, 2009; Byram & Feng, 2006; Byram & Dervin, 2008; Cots, Aguilar, Mas-Alcolea, & Llanes, 2016; Messelink, van Maele, & Spencer-Oatey, 2015; Salisbury, 2011) (in Aguilar, 2018). Albeit, promoting intercultural competence in ESP has received the least attention. The rationale behind this is that this field is still in its infancy.

ESP education should exceed the teaching of grammar and vocabulary as it does not aid learners deploy the acquired language in real contexts. The target of ESP nowadays should be linked with communication; i.e. EFL learners should acquire the necessary skills that will aid them to achieve interpersonal interactions through ensuring comprehension in terms of "action" and "identity" (Galbeaza, 2020), in the era of globalization and the increasingly multicultural communication. ESP teaching scenario that triggers intercultural awareness may pave the way for the students to study or even work abroad. For the significance of teaching culture in foreign language learning, Planken and colleagues (2004, in Galbeaza, 2020, p. 307))advocate that the focus is " on the shift from the traditional ways of teaching a foreign language (with focus on language and vocabulary structures), to teaching cultural elements from the very beginning, promoting thus the learners' so-called "intercultural awareness" and "intercultural communication competence".

A noteworthy illustration of teaching culture in ESP classes is through communication. Many scholars (Fantini, 2019; Newton et al., 2010) declared that "Intercultural Communicative Language Teaching" should be an educational goal, ESP teachers should not, thus, only teach the students how to communicate in the foreign language but also to achieve successful communication through understanding cultural differences with recognition of the "national self". Teaching culture can be illustrated in ESP classroom through telephone conversations, interviews, negotiation. These tasks would permit the learners to know how to react when dealing with partners from a foreign culture: typical phrases, non-verbal communication beheviour should also be considered when engaging in these tasks.

The integration of culture in foreign language instruction is based on five major principles: active construction, making connections, social interaction, reflection and responsibility (Liddicoat, 2004).
A systematic approach can be employed to introduce culture in ESP classroom. First the instructor may inquire of the students regarding their prejudice about the other culture. Second, he would instruct them to engage in a real communication with classmates. Third, the students may be guided to interpret their interactions through expressing their thoughts with their colleagues. Finally, they might be asked to think critically of their previous assumptions, behavior and interaction.

Byram and Morgan (1994, pp. 43-44) perceive the comparative method are a working method for teaching culture. The learners are compelled to compare and contrast their own culture and the other culture and they are asked to accept differences between cultures through developing understanding of the cultures cognitively by building other schemata of the other culture in their brain. By comparison method, the learners should be placed in the "third position" situated between the two cultures where they maintain successful communication more comfortably with individuals belonging to the target culture, while keeping their own identity (Dellit, 2005).

Various cognitive processes are activated in the incorporation of culture in ESP classes: noticing, comparing, reflecting and interacting. The first process "noticing" (Richard Schimidt, 1990) can function through paying special attention to given stimuli "the new culture" and to observe and compare it with

previous experience to notice what should be noticed. Comparison is the second process that permits the students to compare what they have observed with their own culture to identify similarities and differences. Reflecting is the next process where the brain activates thinking through making interaction between the self and the external world to extract attitudes. Within this process, the following mental actions are activated: observing the experience, making inferences from it, having a relation to it through perplexity, hesitation or doubt, making a hypothesis or multiple hypotheses, reconstructing the experience, based on the formulated hypothesis and then taking action. Interacting is the last process where the brain creates an environment for interaction allowing for practicing intercultural communicative skills, here the brain shifts from the status of an analyst to a participant. Learners create personal meanings, communicate them, explore them and even reshape them in response to others, which keeps a dynamic interconnection between language and culture (Galbeaza, 2020).

5. Research Methodology and Procedure

An ESP course adhering to PBL is provided in detail. This section is divided into two main parts, the first part provides an ESP lesson plan through the consideration of the main objectives, the different units, course steps, teaching materials, learning tasks and evaluation. The second part is devoted to investigating the students' attitudes towards the role of the course in developing their problem-solving skills as well as their intercultural awareness.

5.1.Participants

The participants of this study are 40 Master 1 students at the department of Nutrition, Institute of Nutrition, Food and Agri-food technology (INATAA), University of Constantine 1, Algeria. The participants are enrolled in ESP course for science and technology that is compulsory in the Management of Food quality Master degree. They are expected to have an intermediate level in English as they have studied it for four years in the middle school and three years in the secondary school. It is noteworthy that English has been taught at the university for one semester in the third year of Bachelor degree. These participants are, hence, expected to be ready to receive an ESP instruction that goes beyond the learning of language structures and vocabulary and would, consequently, show interest in engaging in problem-based instruction as an educational objective.

5.2.PBL Case study: course description

TBL approach is implemented in the current ESP course for 12 sessions from 14 weeks of instructional period. Each session lasts for three hours and is organized weekly according to the students' whole training program. The first week was devoted to explaining the course objectives to the students, principles of PBL and the procedure they are compelled to follow for their training. During the second week, the teacher presented the teaching material through listening to a video in relation to the students' specialty 'importance of nutrition to the brain' and reading an article in the field "Nutrition, Health and fitness" as well as making classroom debate with regard to the article's main ideas. At the end of the session, the students were instructed to work collaboratively to bring a list of topics in relation to the article content that could involve problematic issues to address in upcoming sessions.

The overall objective of the current ESP course is to make the students capable to practice the different language skills in real life situations through solving problems, challenges or perplexities pertaining to nutrition. The implementation of PBL was thought through to attain this target. PBL does not only equip learners with problem solving capabilities but rather drives them to activate higher order thinking skills, like problem solving and critical thinking skills, boosts collaborative learning inside and

outside the classroom, and fosters the learners' motivation and interest through engaging them in meaningful tasks. (Tuzlukova & Singh, 2018). This innovative approach would also allow to enhance the students' intercultural competence during problem solving tasks, especially in the tasks that demonstrate different cultures.
To attain these objectives, 12 tasks were presented according to the students' choice. The aim of the first task is to determine signs of good health. The second task requires from the students to evaluate their diet for a week. The third task purports to highlight the issue food practices during fasting and festivity. The fourth task attempts to collect proverbs that deal with nutrition in general or nutrition and health in particular. The fifth task is to classify food into groups and indicate how they should be consumed. The purpose of the six task is to bring an eating disorder, uncover its causes, its consequence and provide nutritional recommendations. The seventh task requires from the students to talk about the negative side of adolescent food practices. The eighth task aims to establish a pyramid of healthy diet. The ninth task requires from the students to present a healthy menu for a week. The aim of the tenth task is to provide healthy nutrition for different age groups according to their needs. In the eleventh task, the students are required to bring a list of protective food and make recommendations to their consumption. In the last task, they were required to talk about sex differences and nutritional requirements. As has been mentioned earlier, the students need to think of a problematic situation to reformulate these tasks and work collaboratively to solve them.

It is worth noting that ESP classroom is a workshop directed by the students. Each session starts by a task reformulated into a problem to work out for the whole session. Collaboration is a required principle either during classroom interaction or out-class homework. The students work collaboratively in groups ranging from 3to 5 students **(**Cawley, 1989**)** to solve the problem by first determining it, putting what they already know in relation to it, identifying the required skills to solve it; bringing possible solutions and making evaluations to these solutions. The total number of subgroups working in the whole classroom is about 10 to 15 subgroups according to the total number of students. As has been mentioned in the theoretical framework, the teacher is a facilitator that starts questioning the students, directs them in findings solutions and determines the required skills. He encourages the students' participation either among the group or in front of the whole class. Further, he ensures better comprehension of the instructions and he is the one who encourages a sense of the students' responsibility within the group.

Regarding the teaching material, the primary source of information was obtained from the net. The high availability of information through various online texts or videos offers a wide array of instructional resources for the current ESP course through providing motivating content. A simple click on the keywords from the students' choice provides access to a variety of textual and video resources, generating concepts for diverse problem-solving tasks. The link of these materials is copied and sent to the students for classroom instruction.

In PBL, in addition to eliciting higher-order skills, specific language structures are requisite for solving the assigned problems. This approach allows for the practice of language rules. For instance, "tenses" when talking about nutritional requirements or food habits and eating disorders; "adjectives" and "adverbs" as well as "quantifiers" when comparing different age groups with nutritional needs or when comparing menus across cultures; "models" when recommending to consume different food groups; different types of "nouns" when talking about food groups, nutrients, and so forth. Vocabulary is another language item that could be promoted through PBL. The wide array of problem tasks facilitates the students' expansion of their vocabulary repertoire. In the same vein, the four language skills (reading, writing, listening and speaking) are all practiced in the current course based on PBL. The students are, for example, required to read the different materials to determine the problem, write down possible hypotheses for solving it, listen to each other's' hypotheses and evaluate them and discuss orally the possible solutions.

As far as assessment is concerned, two kinds of assessment are worth to highlighted in PBL: quantitative assessment and qualitative assessment. The students evaluate their efficacy in solving the problems using the necessary language and problem-solving competencies; they also assess their area of strengths and weakness in the different facets of PBL. The former assessment is made through making each other's' outcomes or PBL final product and the latter through weekly checklists to measure the students' acquired skills in PBL as well as their weaknesses and strengths in problem solving areas. The checklists permit to assess as well the students' intercultural competence.
The following is a framework for designing TBL in the current ESP for Nutrition (adapted from Willis, 1996)

Stages	Procedure	Interaction
Introductory phase	- Brainstorming (the teacher reminds the students of the title of the topic to work on). - The students make groups to listen to videos or read texts in relation to the topic to enlarge their knowledge. - They raise different questions that can be transferred into possible problems for investigation.	Teacher - Student
Determination of the problem phase	- The students work collaboratively to determine the final problem. - They notify their acquired knowledge and their needs to plan for possible solutions	Student-Student
Planning phase	- The students cut the problem into sub-problems - They blueprint what they discover as possible solutions - They apply the necessary knowledge and language competencies to solve the problem	Student-Student
Realization phase	- Each subgroup prepares a report to present it later to the classroom. - The teachers goes over the subgroups to ensure the students interaction and encourage them for participation. - Mistakes are allowed as the focus is on the problem not language.	Student-Student
Report phase	- The students present their reports in front of the classroom. - Their classmates may ask questions and make comments. - The teacher gives feedback on the content and language.	Student-Student
Analysis phase	- The students are asked to put the language structures they applied. - They write down the new words they acquired.	Student-Student

	- They also write down the thinking skills they employed to solve the problem.	
Evaluation phase	- The students make assessment of each others' reports through the consideration of the content and language. - The teacher considers the acquired skills the students have identified and makes an evaluation to the students.	Teacher-Student

Table1. ESP lesson plan based on the framework proposed by Willis, 1996

As far as the integration of culture is concerned, the contrastive comparative approach is adopted (Byram & Morgan, 1994). The analysis of disparities through the comparison and contrast of one's native culture with the foreign enables the students to recognize their national identity (national self), discover the culture of the second language (explore cultural diversity), build awareness of their cultural schemata, and, equally, establish a new cognitive schemata for the new culture (Dellit, 2005). As claimed in the theoretical framework, culture could be integrated in an ESP classroom through reaching successful communication that allows to recognize cultural differences (Fantini, 2019; Newton et al., 2010). In the current ESP course for nutrition, culture is integrated through providing a variety of cultural topics, such as giving proverbs in relation to nutrition and health, food habits in festivity and fasting, teenagers food practices, establishing a healthy menu, and so forth.. These subjects would enable students to attain proficient communication skills in the future when communicating with foreign people as they increase their awareness of the cultural differences between their own culture and the foreign culture. TBL provides an opportunity not only to boost the students intercultural competence, but also to reinforce vocabulary acquisition, as vocabulary is argued to be best acquired in real contexts showing the culture of the foreign language (Tuzlukova & Singh, 2018). It is also emphasized that vocabulary constitutes an integral component of language and that language cannot be taught without culture and the other way around (Byram & Morgan, 1994). Through TBL, the students can make debates showing their attitudes towards the other culture. Debate is also widely recognized as an opportunity for the students to express their opinions of the foreign culture and would, hence, develop their cultural sensitivity. (Salleh et al. 2018)

5.3.Investigating the students' attitudes towards the benefits of TBL in enhancing their problem-solving skills and intercultural competence.

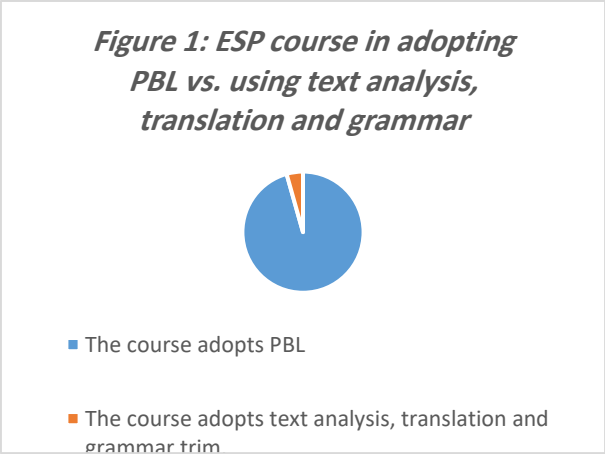
In order to measure the students' attitudes towards the usefulness of the implementation of PBL approach in the current ESP course in developing their problem solving and their intercultural awareness, the descriptive method is opted for. A questionnaire was administered to a sample of 40 students at Constantine 1 University. The survey tool aimed primarily to obtain data on whether ESP course follows problem-based instruction and whether it develops the students' problem-solving skills. It also investigates whether PBL approach in the current ESP course tackles the issue of culture and, accordingly, develops the students' intercultural awareness.

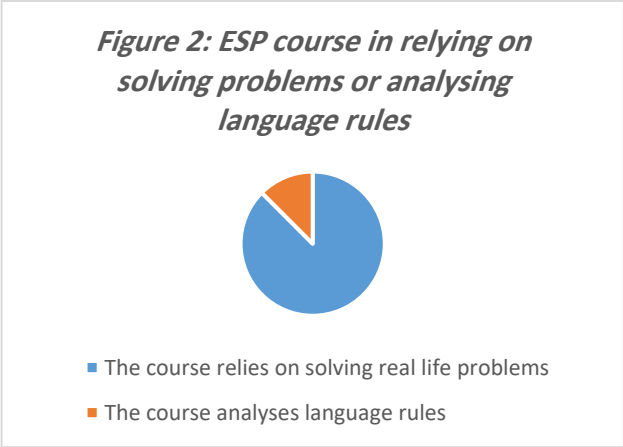
As a procedure, the questionnaire was administered via Google Forms application at the end of the semester after the fourteen weeks of training on PBL. Prior to conducting the questionnaire, the instructor provides the students with an explanation of basic concepts like PBL, intercultural competence, intercultural awareness, ESP, and so forth, so to obtain accurate and reliable answers. Google forms survey encompasses 12 open and closed-ended questions grouped into three sections. The first section includes 5 items that aim to explore the students' perceptions of the implementation of PBL in the current ESP course and whether the latter is based on the major principles of this approach: problem as stimulus, teacher as a facilitator and group work as a strategy. The second section incorporates 3 questions that measure the students' attitudes towards the current course in developing their critical thinking and problem-solving

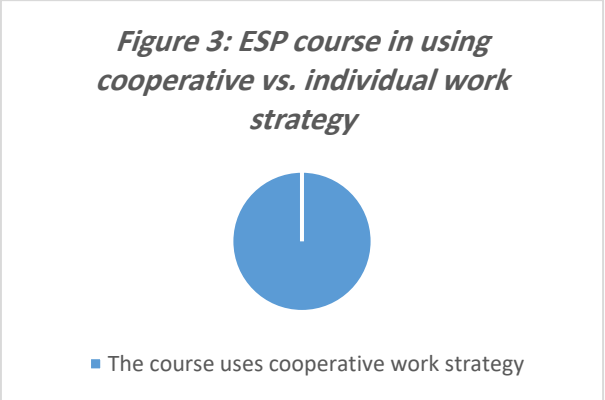
skills. The third section encompasses 4 questions that evaluate the integration of culture in the application of PBL in the current ESP course and whether the course boosts the students' intercultural awareness.

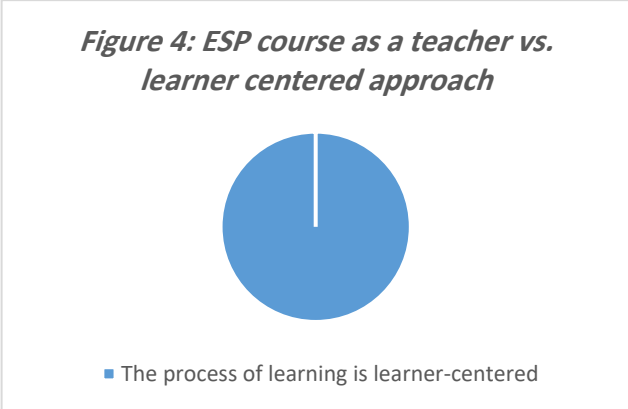
6. Results and discussion

We have mentioned earlier that the study purports to assess the students' perceptions of ESP course for Nutrition whether it follows principles of PBL and their attitudes towards the usefulness of this approach in developing their problem-solving skills and intercultural awareness. In attaining these objectives, these issues were addressed in the three sections of the questionnaire. The data was analyzed using the quantitative descriptive data analysis technique through using percentages; the percentages were then interpreted to draw conclusions.



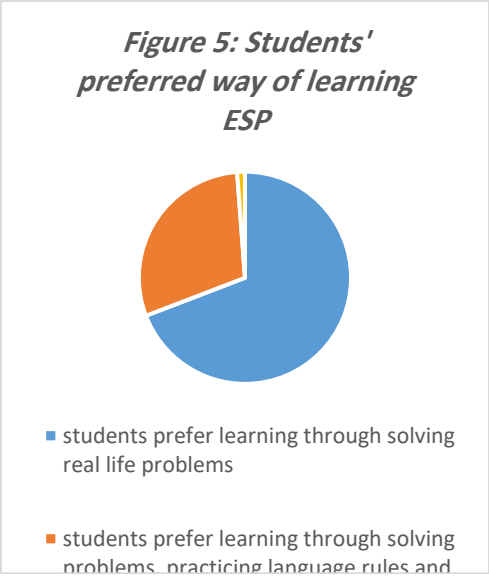


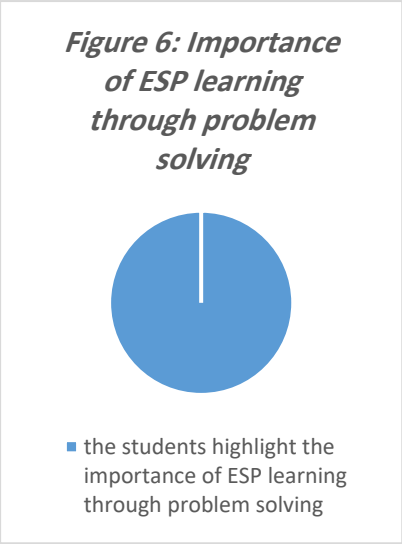


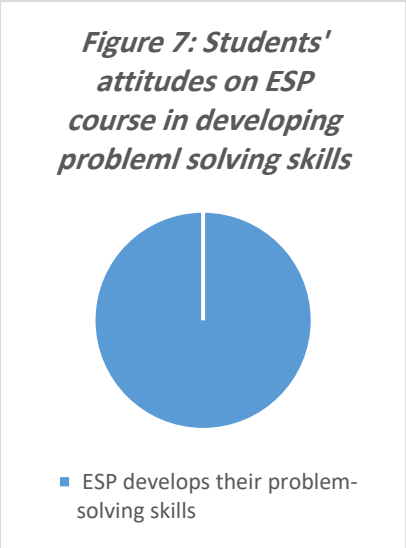


The results of the first section of the questionnaire confirm that principles of PBL were underlined in ESP course. In the first item, the majority of students (70 %) indicate that it adopts PBL, while the others have added that it ponders upon text analysis, translation and grammar, which confirms the use of PBL in addition to focus on language learning. In the second item, the majority of the participants (87,5%) answer that the course relies on solving real life problems rather than analyzing language rules. In the third item, all the students (100%) confirm that the course uses cooperative work strategy. In the fourth item, all of them indicate that the whole process of learning is student-centered and in the last item, they all agree that the teacher is a facilitator than a complete authority. These results confirm that the principles of problem as a stimulus, teacher as a facilitator and group work as a strategy (Dolmans et al., 2005) were taken into consideration in the course. These results go hand in hand with contemporary approaches to ESP teaching that focus on problem solving instruction; that English as a foreign language is best acquired through

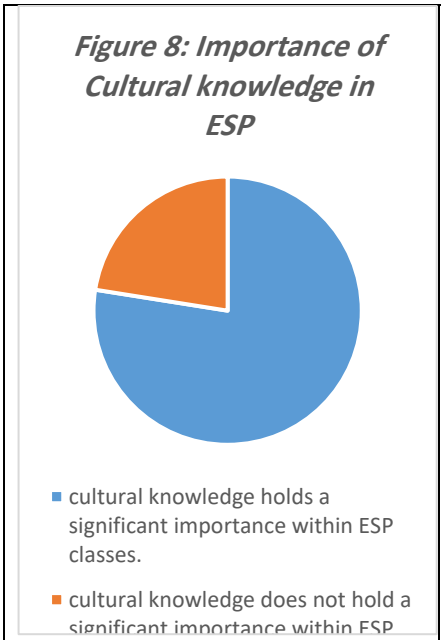
solving real world problems; and that ESP best strategy is to focus on learning the foreign language in real word scenarios with focus on the development of language skills as well (e.g. Tuzlukova & Singh, 2018; Kurmanayeva et al., 2021).

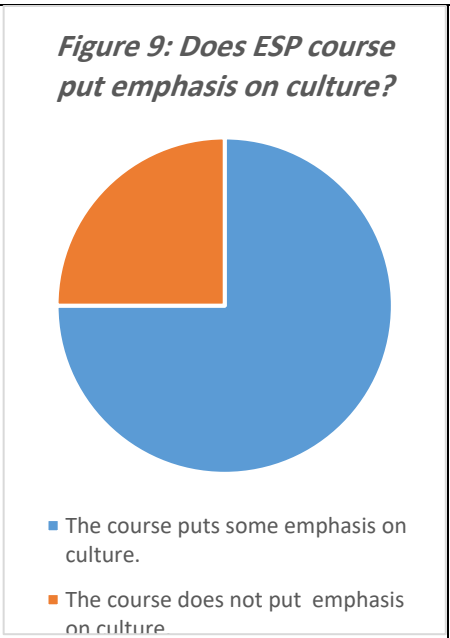


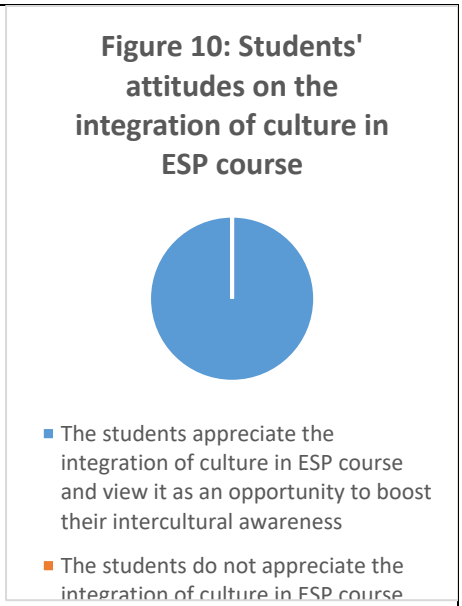




The results of the second section elucidate the students' positive attitudes towards the current ESP course. For example, in the first item, the majority of the sample (70%) prefer learning through solving real life problems, while the others (30%) declare that they prefer learning through solving problems, practicing language rules and translation. In the second item, all of the participants (100%) highlight the importance of ESP learning through problem solving. In the last item, all them (100%) agree that ESP develops their problem-solving skills. These results add evidence to the usefulness of PBL in enhancing problem solving ((Salleh et al., 2018).







The integration of culture in ESP is also investigated in the third section through measuring the students' attitudes towards developing their intercultural awareness. Overall, the students do show a positive attitude towards the consideration of this variable in ESP course. The majority (77,5%) acknowledge that cultural knowledge holds a significant importance within ESP classes. These findings agree with other works that focus on culture in ESP (Byram & Morgan, 1994; Aguilar, 2018). A high percentage (75%) confirms that the course puts some emphasis on culture. All the students (100%) appreciate the integration of culture in ESP course and view it as an opportunity to boost their intercultural awareness. These findings as evidenced by research (Aguilar, 2018; Planken et al., 2004; Galbeaza, 2020) demonstrate how integrating culture is beneficial in increasing the students' intercultural competence.

Conclusion

While current ESP research places emphasis on addressing the learners' needs in syllabus design and strategies for their fulfillment, the present paper implements PBL as an innovative methodology for language instruction in ESP classroom. In the same vein, the work intends to incorporate cultural elements in ESP instruction while research in ESP and culture is still in its infancy. This paper offers a comprehensive theoretical framework for PBL and its application in ESP classroom as well as for the integration of culture into English instruction, particularly in ESP context. A case study method was then provided through a detailed description of the current ESP course and how principles of PBL are underpinned as well as illustrating how culture is integrated. To examine the effectiveness of this approach in enhancing the students' problem-solving abilities and intercultural competence, an assessment of the students' attitudes was conducted via a survey. The findings substantiate their appreciation of the course in terms of fostering not only their problem-solving skills but also their intercultural awareness. A set of recommendations are offered from the study:

- ESP is best practiced through collaborative work and via solving real life problems.
- ESP classrooms ought to ponder upon the integration of cultural topics as it is beneficial to boost the students' intercultural awareness.

- Selecting the groups of students to work together should be done attentively by means of assembling different levels to ensure cooperation and effectiveness.
- Despite the fact that the process of learning is student-centered, the teachers' role is paramount as a guide, a source of encouragement, and as feedback provider.
- The chosen tasks ought to be in relation with the students' specialty to increase interest, and the language to be chosen for instruction should not surpass their proficiency levels.
- Weekly checklists which enable the students to evaluate their strengths and weaknesses are also deemed pivotal for the efficacy of instruction.

For the accelerating progress of technological advancement and the adaptation of online instruction worldwide, another investigation of online PBL on ESP represents a prospective avenue for future research. A case study for the implementation of online PBL in ESP classroom and the investigation of the students' attitudes towards this methodology will be thoroughly examined in a future inquiry.

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