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Investigating ESP Teachers' Beliefs about and Approaches to Using Problem-Based Learning in Higher Education Contexts

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Abstract: *Even though problem-based learning (PBL) – which involves learners collaborating on generating, analysing and selecting solutions to open-ended real-life problems - has been in use in various disciplines for over five decades, its adoption in foreign language education, including English for Specific Purposes (ESP), is relatively recent and under-researched. This is despite the fact that PBL seems to offer multiple advantages for learners. These range from fostering higher-order thinking skills, interdisciplinarity and learner autonomy, to preparing students for the challenges involved in working alongside hallucination-prone AI-based tools. To address this research gap, an online survey collected data from 44 ESP teachers with experience of PBL in higher education concerning their beliefs about and their approaches to using the approach. The results indicate a high level of satisfaction with the method as well as a high level of agreement in relation to a number of beliefs commonly associated with PBL, especially its relationship with fostering learning autonomy. However, the findings indicate less agreement with regard to two main features of PBL as identified in the literature, namely its focus on real-life problems with no fixed solutions. In light of the various challenges with PBL identified by the respondents, this paper proposes a number of measures relevant for teacher training and professional development to facilitate a wider implementation of the approach in ESP contexts.*

Key words: *Problem-based learning (PBL), Language for Specific Purposes (LSP), English for Specific Purposes (ESP), learner autonomy, teacher beliefs*

1. Introduction

Language for Specific Purposes (LSP) / English for Specific Purposes (ESP) education does not remain static. Instead, ESP, which views "understanding learner needs [...] [as] its alpha and omega" (Belcher, 2017, p. 5), is constantly evolving in its mission to best address them and to stay up-to-date with the developments both within and outside the field (see e.g. Hyland, 2022, p. 216). The motivation to innovate educational practices was also behind the introduction of problem-based learning (PBL) in medical education in the 1960s (Ansarian & Teoh, 2018, p.2). More specifically, it was developed in address the problems associated with traditional educational practices (Barrows, 2002, p. 119). Although PBL was pioneered by McMaster University Medical School in Canada, it is Maastricht University that has been the main driver of its internationalisation (Servant-Miklos, 2019, p. 284). Gradually, the method spread from healthcare education to other disciplines, including business education, engineering, social sciences and humanities (Pijl-Zieber, 2006, p. 2) among others.

In contrast, language education has to some degree remained "untouched" by the growing popularity of PBL in other disciplines (Ansarian & Teoh, 2018, p. ix) and the body of research on PBL in this field is still limited (Al-Busaidi et al, 2021, p.2). Yet, the approach not only "has a particularly great potential to aid language acquisition and to emphasize the meaningful use of the language as a tool for communication and problem solving" (Al-Busaidi et al, 2021, p.2), but is also regarded as a very effective method for teaching ESP in higher education contexts (Šliogerienė et al., 2025). Whereas the body of literature on PBL in LSP/ESP seems to be still relatively small, some of the diverse contexts in which the approach has been used include German for biological engineering (Neville and Britt, 2007), biomedical English (Wood & Head, 2004), English for undergraduate science students (Al-Busaidi et al., 2021) and military English (Dragomir et al., 2019).

An experiential learning approach (Hmelo-Silver, 2004, p. 236), defined as "a learner-centered pedagogy, [...] characterized by students working collaboratively in small groups to solve messy, ill-structured problems that mirror real-world problems encountered by expert professionals in the field" (Koh et al., 2019, p. 17), it has met with positive feedback by medical educators and students alike (Walsh, 2005, p. 8; Ansarian & Teoh, 2018, p.49). The apparent tardiness in embracing PBL by language education in comparison can be explained by a number of factors, not least the absence of a "solid" PBL model specific to language education and the fact that in problem-based *language* learning, language is both "a tool and target" (Ansarian & Teoh, 2018, p.4).

The fact that language education is a late adopter when it comes to embracing PBL raises the question as to what factors can ensure, and conversely, prevent a wider implementation of the approach. Studies that have investigated such factors seem to have focused on EFL contexts (see e.g. Moslemi Nezhad Arani et al., 2023), with the area of ESP appearing to be largely unexplored. To address this issue, an online survey was designed to investigate ESP teachers' experience with and, if applicable, their approach to using PBL in higher education contexts. This paper reports on the respondents' beliefs about and their approaches to implementing PBL as it aims to identify aspects that may need to be addressed in teacher training and continuous professional development to contribute to a wider implementation of the approach.

2. Literature review

2.1. Characteristics of PBL in language education

In the context of language education, PBL shares similarities with a range of approaches in which "students learn the target language by *using* it, rather than being presented with and then practicing predetermined language structures" (Mathews-Aydinli, 2007, p.1; emphasis in the original).

However, while sharing commonalities with other communicative methods, PBL stands out due to its focus on problems that language learners have to solve, as opposed to "task[s] or goal[s] to accomplish as in task-based instruction" (Hearn & Hoppe, 2008, p. 41). Such problem scenarios or "cases" (Hearn & Hopper, 2008) are characterised by their ill-structuredness and authenticity (Al-Busaidi et al., 2021; Ansarian & Teoh, 2018; Azman & Shin, 2012; Koh et al., 2019). In other words, there is no "single correct solution" that learners have to reach (Hmelo-Silver, 2004, p. 237); instead, "the problem drives the learning" as students attempt to solve it (Woods et al., 1996, p. 231). Moreover, problems are supposed to mirror situations that learners may actually be confronted with in real life (Ansarian & Teoh, 2018, p. 34). By promoting authenticity and emphasising *inter alia* problem-solving, critical thinking, communication and collaboration, the method can therefore foster the development of key 21st century skills (Koh et al., 2019, p. 18) and help to prepare students for the workplace (Azman & Shin, 2012, p. 119). It seems therefore to be well-aligned with the objectives of ESP education with its "academic, professional or workplace focus" (Woodrow, 2018, p. 6) and commitment to learner-centredness (Belcher, 2017, p.2).

Another key feature of PBL, though not exclusive to it, involves its focus on learner collaboration. In practical terms, this means that learners work in small groups on exploring solutions to problems, selecting the most viable ones and then sharing the results of their work with others (Mathews-Aydinli, 2007). In addition to contributing to the above processes, learners can take on various roles within the group, e.g. those of a chairperson, secretary, or timekeeper (Djurić, 2005, pp. 13-14).

2.2. Teacher's role in PBL

The use of interesting problems to stimulate learning and group work to solve them are just two of the four essential characteristics of PBL, with the other two being self-directed and self-regulated learning and teachers acting as facilitators (van der Vleuten & Schuwirth, 2019, p. 904).

Instead of being "robots expected only to impart information" (Ansarian & Teoh, 2018, pp. 10-11), teachers in PBL are facilitators, guides and coaches (Hmelo-Silver, 2004, p.236; Neville and Britt, 2007, p. 233; Koh et al., 2019, p.18) that organise the process, support learners throughout it and assess their performance (Mathews-Aydinli, 2007). As their task involves creating "learning opportunities" that enable learners to rely on their own abilities as they try to identify solutions (Ansarian & Teoh, 2018, p. 21), PBL is in stark contrast to traditional "transmissionist" approaches to language learning (Moslemi Nezhad Arani et al., 2023, p. 2). In other words, the focus lies on "students learning, not on teachers teaching" (Barrett & Moore, 2011, p. 4).

In the context of ESP, even though PBL is said to be appropriate for all types of English courses and proficiency levels, the level of support and the difficulty level of problems may need to be adjusted as required (Azman & Shin, 2012, p. 122). In addition, since collaboration in small groups may pose challenges for learners, teachers also are expected to foster a positive group atmosphere, deal with group work related problems (Hendry et al., 2003, p. 609) and, in addition, establish criteria to ensure equal participation by all group members (Azman & Shin, 2012, p. 123).

2.3. The PBL process in language learning

The PBL process is divided into a number of stages (see e.g. Hmelo-Silver, 2004; Walsh, 2005). For instance, Walsh (2005) describes seven steps used at McMaster Faculty of Health Sciences: (1) problem identification; (2) exploration of prior knowledge; (3) hypothesis generation; (4) identification of learning issues – i.e. "questions that cannot be answered with current knowledge

within the group" (p. 5) – which guide further research and (5) self-study, the results of which are subsequently (6) applied to the problem; and (7) lastly, reflection on learning.

However, as already pointed out in the Introduction, the existing PBL models were not developed with language education in mind (Ansarian & Teoh, 2018, p. 27) and therefore, "[i]t would be naïve to believe that the medical school model of PBL could be imported into other settings without considering how to adapt it [...]" (Hmelo-Silver, 2004, p. 260).

Therefore, a number of models have been put forward over the last two decades that focus specifically on language education. These include those discussed by Jurković (2005), Mathews-Aydinli (2007), Ansarian & Teoh (2018) and more recently, Al-Busaidi et al. (2021). Two of those are briefly described below.

In Mathews-Aydinli's (2007, pp. 3-4) model, the first PBL stage involves preteaching during which the teacher explains the rationale for the use of PBL as well as the need for communication in the target language during the process. In the second step, the problem and the key language are introduced to learners who may also be asked to reflect on their previous experience with the problem. This is followed by group formation and provision of necessary resources in stage three. During the fourth stage – analysis of possible solutions – the teacher monitors group work and provides the necessary support, being mindful not to influence the groups' decision-making process. In addition, they also provide feedback on both participation and language used. In the final stage, learners are given the opportunity to present their solutions, which can be complemented by follow-up language-based activities, and assessment of both students' participation and output takes place.

In Ansarian & Teoh's model (2018, pp. 33 -36), the first step focuses on problem creation, which is then followed by introduction to the problem. Stages 3 – 5 involve researching, reasoning and synthesis respectively, during which learners search for information, generate and evaluate solutions. This is followed by an application, or production, stage, and if needed by reapplication (e.g. when learners are required to revise their work). This model also mentions reflection and knowledge as two important stages. The former aims to encourage learners "to think about their performance, self-evaluate themselves, and identify shortcomings" (p. 35). The final stage focuses on the acquisition of knowledge gained by learners through the PBL process. The authors emphasise the fact that the process is cyclical and knowledge gained at the end of one PBL process flows into the next problem.

2.4. Benefits of PBL for language learners

PBL is said to offer various benefits for learners, not least, as already signalled, in relation to fostering learner autonomy understood to be one of the goals of the approach in ESP settings (Celinšek & Kostić Bobanović, 2022, p. 29). This is not only since it "puts the responsibility of learning onto the shoulders of the language learners", but also as it promotes self-assessment and reflection (Ansarian & Teoh, 2018, p. 18) and offers opportunities for peer-to-peer learning (Azman & Shin, 2012, p. 120) or interdependence. All three – learner reflection, self-assessment and interdependence - are closely linked to the concept of learner autonomy (see e.g. Little, Ridley & Ushioda, 2002).

Another important aspect concerns PBL's contribution to higher-order thinking skills (Ansarian & Teoh, 2018) which in practical terms are said to encompass *inter alia* critical thinking and problem-solving (Hague, 2024, p. 11). Higher-order thinking skills are vital for professional success and as such, the need to develop them is recognised by students themselves (Azman & Shin, 2012, p. 109). In view of the rapid developments in the field of generative artificial intelligence (AI), PBL seems to offer significant potential for fostering key professional skills. These include "effective interpersonal skills" that employers expect the workforce to possess to be able to work successfully alongside hallucination-prone AI (Sanders & Wood, 2023). With its emphasis on fostering collaborative learning and critical thinking, PBL seems therefore to be well-placed to prepare graduates for the challenges of the workplace.

However, the benefits of PBL go beyond fostering learner autonomy and higher-order thinking skills and studies suggest that students tend to respond positively to implementation of PBL in language classes (Azman & Shin, 2012; Anthony & Kadir, 2012; Šliogerienė et al., 2025). Moreover, although the impact of PBL on language learning appears to be under-researched (Azman & Shin, 2012, p. 110), there is evidence to suggest that the approach can offer important benefits for the development of language competence and confidence in using English to communicate (Azman & Shin, 2012, Baresh et al., 2019; Šliogerienė et al., 2025) as well as student motivation (Anthony & Kadir, 2012).

2.5. Obstacles to the implementation of PBL in language learning

Despite the potential outlined in the previous sections, as pointed out by Al-Busaidi et al. (2021, pp.7-8), addressing institutional as well as teacher- and student-related challenges is a key

aspect of PBL implementation in language education and may require the use of a more "hybrid" PBL approach with more support and scaffolding. With regard to addressing the student-related challenges, the authors mention providing support in the areas of language input as well as three sets of skills: the interpersonal and thinking skills, research skills and IT skills (Al-Busaidi et al., 2021, pp. 8-10).

With regard to teacher-related challenges, PBL's success depends on "a teacher's ability to accurately implement and introduce students" to the approach (Azman & Shin, 2012, p. 123). In spite of the evidence that ESP teachers have positive perceptions of the method (see e.g. Anthony & Kadir, 2012), its implementation in language classes is not without challenges and the success of PBL depends on identifying factors that may impede its implementation. According to Moslemi Nezhad Arani et al. (2023, p. 2), the EFL literature on such factors, however, "is still on thin ice".

In response, the authors conducted a study in which they identified nine factors that may prevent EFL teachers from using PBL in their courses. These include: "Difficulties in creating a PBL problem/scenario", "The importance of teaching equipment", "Teachers' unfamiliarity with designing a problem/scenario", "Limiting PBL to a specific skill", "Assessment", "Students' unfamiliarity with PBL", "Students' cross-cultural differences", "Teachers' unfamiliarity with PBL", and "Limiting PBL to a specific level of language proficiency" (Moslemi Nezhad Arani et al., 2023, p. 7). Whereas teachers may have no or little influence over factors such as the equipment available, others – e.g. unfamiliarity with the approach and the principles of designing a problem - seem to be within their control. Overall, teacher perceptions, just like student perceptions, appear to be an important factor in the successful implementation of PBL (Ansarian & Teoh, 2018, p. 48), and as such, are worth investigating to identify support needed. This was precisely the purpose of the study described in the following sections.

3. Methodology

For the purpose of this study an 18-item survey was designed in a tool called SoSci survey[1]. The questions ranged from items about the participants' teaching experience and contexts, through their beliefs about and approaches to using PBL in ESP classes, to some basic demographic questions. Most questions were close-ended. The survey design was preceded by a literature review

[1] https://www.soscisurvey.de/en/index

and the questionnaire was pre-tested with three ESP lecturers whose feedback helped to improve the clarity of some questions. The survey was available online for a period of 20 days. The invitation to participate was circulated online via a number of local, national and international professional networks. Participant data were exported from SoSci survey to qualitative data analysis software MAXQDA[2] to conduct descriptive statistics. Microsoft Excel was used for additional analysis and visualisation. In total, 87 respondents completed the survey[3], 51 with experience of PBL in ESP higher education contexts and 36 with no such experience. The following analysis examines the responses of the 44 participants in the former group who answered all relevant survey questions.

4. Results

4.1. Participant characteristics and teaching experience

Out of the 44 ESP teachers with PBL experience in higher education, 20 taught in Germany, while 12 taught in Serbia[4]. The Czech Republic and Greece were represented by 2 participants each, whereas nine other countries (Bosnia and Herzegovina, France, Israel, Poland, Portugal, Romania, Kazakhstan, Spain and Switzerland) were represented by just one participant each. As can be seen from Figure 4.1, half of the participants belonged to the age group 50-59. 33 respondents were female, 10 were male and one respondent preferred not to state their gender.

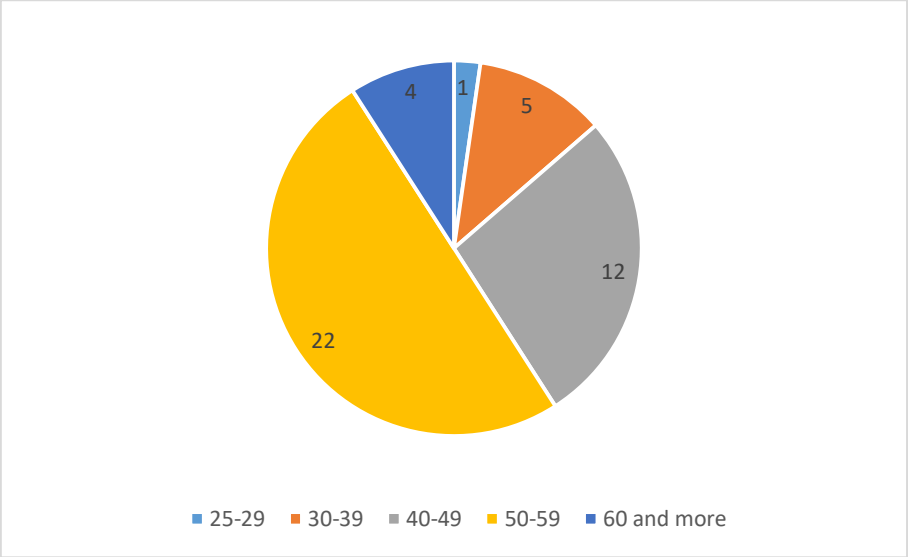

Figure 4.1: Respondents' age groups

[2] https://www.maxqda.com/de/
[3] Six more participants took part but their answers were incomplete and therefore not included in the data analysis.
[4] One participant taught in Serbia and in another country.

10 respondents reported having more than 24 years of ESP teaching experience. Overall, almost 55% of respondents (24 in total) had at least 19 years of teaching experience, which suggests very experienced teaching staff (see Figure 4.2). With regard to the number of years of experience with PBL in tertiary-level ESP courses, the largest group of respondents (11) had 10–12 years of experience with the approach, while another 10 respondents had 4–6 years of experience (see Figure 4.3).

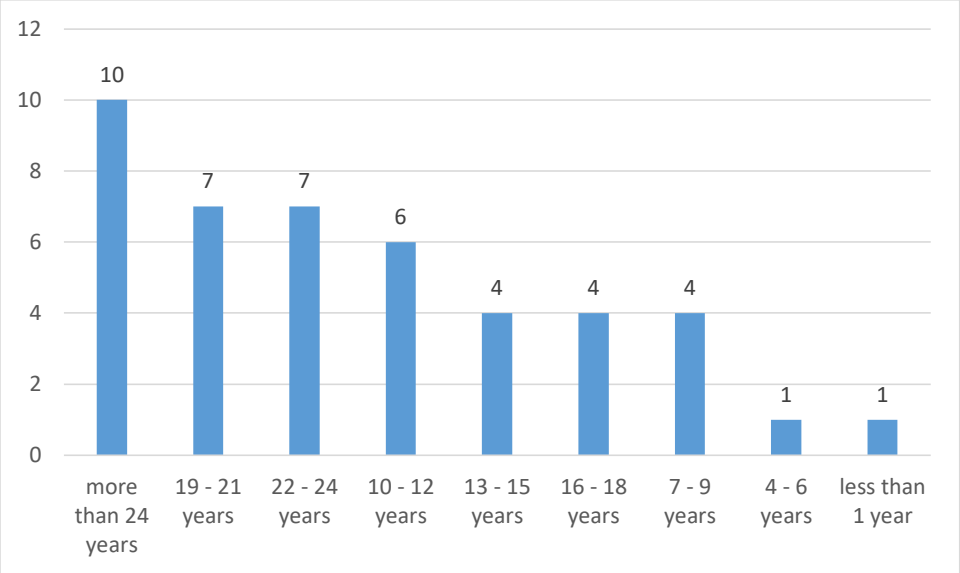

Figure 4.2: Years of ESP teaching experience

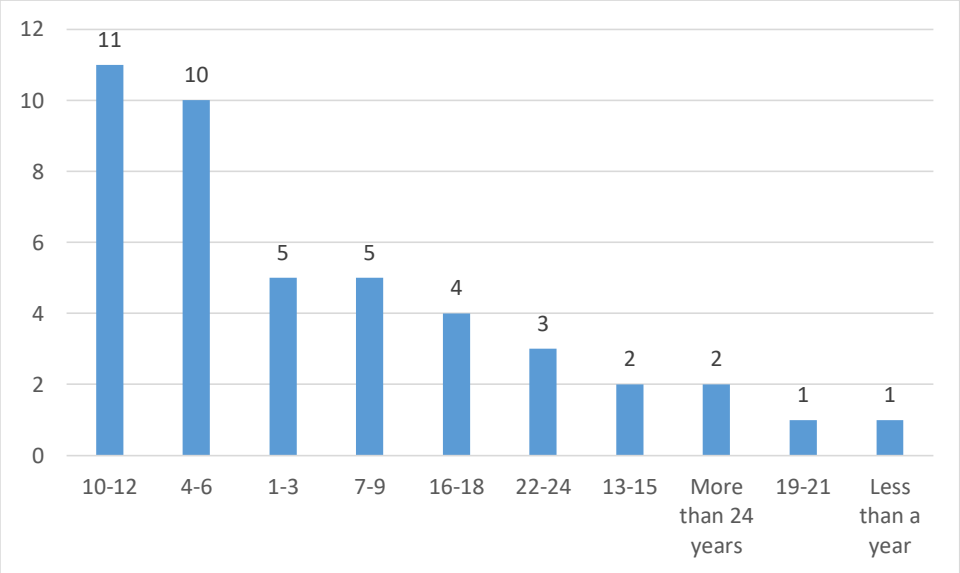

Figure 4.3: Years of experience with PBL in tertiary-level ESP courses

With regard to the ESP branches in which the respondents used PBL the most, these were English for Science and Technology, English for Academic Purposes and English for Business and Economics[5] (see Figure 4.4).

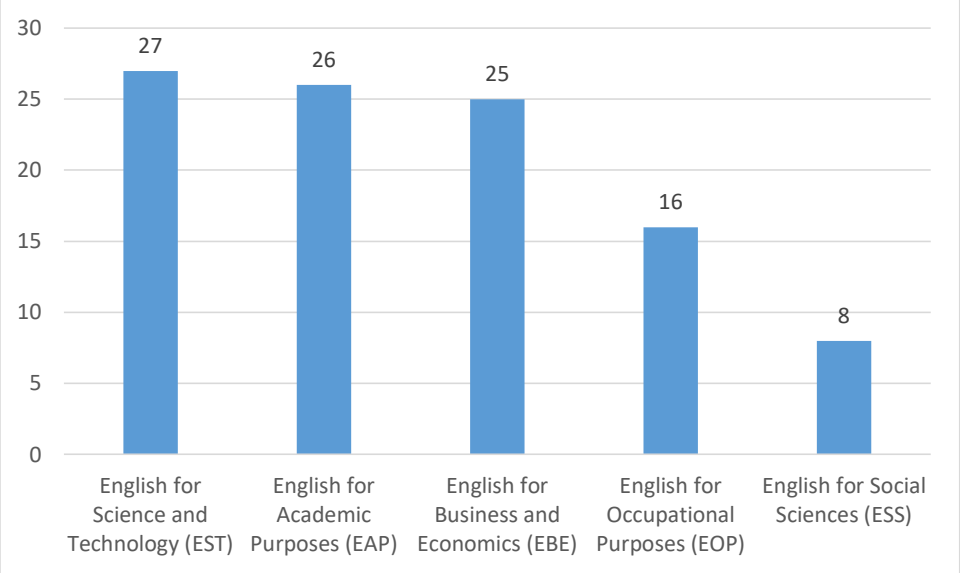

Figure 4.4: ESP branches in which the respondents used PBL

As can be seen from Figure 4.5, 15 respondents used PBL in up to a quarter of their courses, while another 14 used it in 26-50% of their courses. Professional literature was the primary source through which participants (15) learned about the approach.

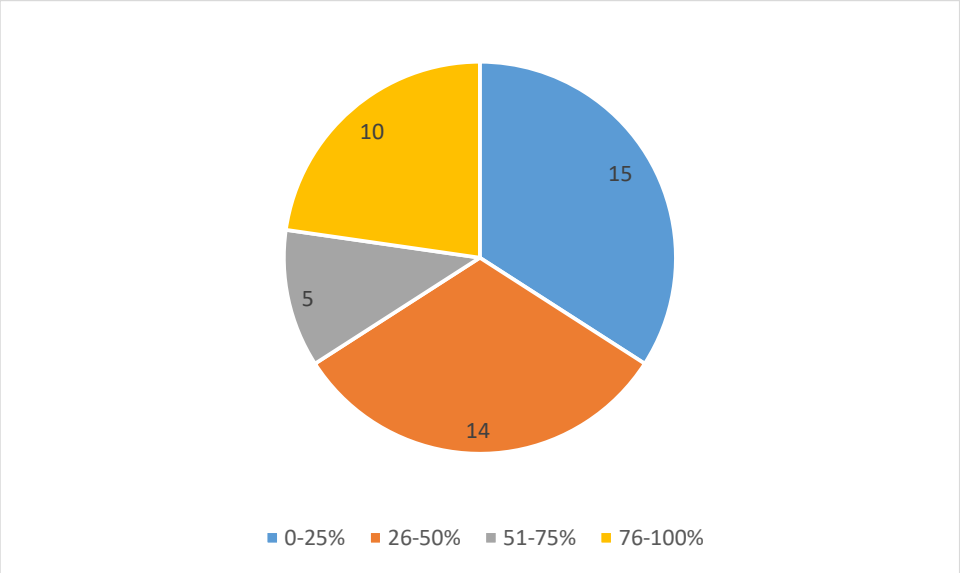

Figure 4.5: The percentage of ESP courses where PBL was used in

[5] The branches referred to in the study are based on Hutchinson & Waters' (1987) classification.

4.2. Teachers' beliefs about and approaches to PBL implementation in ESP classes

In the third part of the survey, the participants were asked to respond to 21 statements on a Likert-type scale from 1 to 5. A response of 1 meant that the respondent "strongly disagreed" with the statement; 2 indicated they "disagreed" and 3 signified being "undecided". 4 and 5 indicated they "agreed" and "strongly agreed" respectively.

The mean scores[6] as well as the standard deviation for the 21 statements are presented in Table 4.1. The statements have been ranked from the highest to the lowest mean score.

Table 4.1: Mean scores and SD for the statements concerning the implementation of PBL in ESP classes

	Statement	The implementation of PBL in ESP classes in higher education ...	Mean	SD	Interpretation
1	AP01_04	should involve students taking more responsibility for their learning	4,50	0,591	SA
2	AP01_13	should involve ESP teachers acting as coaches / facilitators	4,43	0,545	SA
3	AP01_08	should pay attention to the cultural and social contexts of the problems given to students to solve	4,20	0,734	A
4	AP01_10	should involve students working collaboratively in small groups	4,18	0,724	A
5	AP01_16	should involve students reflecting individually on the process and the products of learning	4,16	0,645	A
6	AP01_09	should involve problems that are closely aligned with the learning outcomes	4,14	0,795	A
7	AP01_02	should involve collaboration between subject teachers and ESP teachers	3,95	0,888	A
8	AP01_03	should involve asking students about their needs and interests prior to setting problems	3,93	0,974	A
9	AP01_14	should involve peer-assessment	3,89	0,813	A
10	AP01_15	should involve student self-assessment	3,89	0,841	A
11	AP01_19	should involve students working with various digital tools	3,89	0,920	A
12	AP01_12	should involve students working in mixed-ability groups	3,86	0,878	A
13	AP01_11	should involve students communicating and interacting only in English during groupwork	3,82	0,995	A
14	AP01_20	should allow students to use AI-based tools (e.g. ChatGPT)	3,59	0,871	A
15	AP01_17	should prioritise the development of English language competence over the acquisition of subject	3,55	0,875	A
16	AP01_01	should be gradual	3,45	0,975	A
17	AP01_18	should involve only the use of authentic teaching and learning materials	3,30	1,069	U
18	AP01_07	should involve only real-life problems	3,07	1,108	U
19	AP01_05	should only be used with students at levels B1[...] and above	2,98	1,210	U
20	AP01_06	should involve only problems to which no fixed solutions exist	2,55	0,975	D
21	AP01_21	should involve in-person teaching only	2,43	0,925	D

Overall, the participants strongly agreed with two statements and agreed with 14 more. They were undecided about three statements and disagreed with two. They did not disagree strongly with any of the 21 statements.

The following statements – the implementation of PBL in ESP classes in higher education "should involve students taking more responsibility for their learning" (M=4.50) and "should involve ESP teachers acting as coaches / facilitators" (M=4.43) – were the only two that the respondents agreed strongly with. Out of the 14 statements they agreed with, four had mean values in the range

[6] The means were interpreted based on the following ranges: "Strongly disagree" = 1.00 - 1.80, "Disagree" = 1.81 - 2.60, "Undecided" = 2.61 – 3.40, "Agree" = 3.41 - 4.20, and "Strongly agree" = 4.21 - 5.00.

4.00 – 4.20. These included the following statements: The implementation of PBL "should pay attention to the cultural and social contexts of the problems given to students to solve" (M=4.20); "should involve students working collaboratively in small groups" (M=4.18), "should involve students reflecting individually on the process and the products of learning" (M=4.16) and "should involve problems that are closely aligned with the learning outcomes" (M=4.14).

The respondents appeared undecided about one statement which in the literature is quite strongly associated with PBL, namely the belief that its implementation "should involve only real-life problems" (M=3.07). They also seemed undecided in relation to the need for authentic teaching and learning materials only (M=3.30).

Lastly, they disagreed with the following two statements: the implementation of PBL in ESP classes in higher education "should involve only problems to which no fixed solutions exist" (M=2.55) and "should involve in-person teaching only" (M=2.43).

In addition, in a series of 17 statements, the respondents were also asked about their own PBL practices, again using a 5-point Likert-type scale. More specifically, they were asked to indicate how often they used the steps listed. 1 indicated "never" whereas 2 indicated "rarely"; 3 signified "sometimes"; 4 and 5 indicated "often" and "always" respectively[7].

Table 4.2: Mean scores and SD for the statements concerning participants' PBL-related practices

	Statement	How often do you use the following steps when using PBL in your ESPhigher education classes?	Mean	SD	Interpretation
1	AP07_07	asking students to generate possible solutions to the problem	4,59	0,693	A
2	AP07_02	introducing students to the problem they will have to solve	4,52	0,731	A
3	AP07_14	providing opportunities for students to present their solutions to other groups	4,39	0,920	A
4	AP07_12	providing language-related help if required by students during group work	4,27	0,845	A
5	AP07_03	introducing the language relevant to the problem given (e.g.vocabulary, grammar) prior to the problem-solving stage	4,16	0,776	O
6	AP07_08	asking students to assess the viability of potential solutions	4,11	0,920	O
7	AP07_17	assessing the solutions developed by groups	4,09	1,117	O
8	AP07_06	providing students with the resources needed to work on the problem	4,07	0,950	O
9	AP07_09	asking students to select the most viable solution to the problem	4,07	0,950	O
10	AP07_04	asking students about their own experiences with the problem prior to the problem-solving stage	4,00	1,034	O
11	AP07_10	observing students during group work and taking notes on the language-related issues they encounter	3,93	0,925	O
12	AP07_15	providing follow-up language-focused activities (e.g. focusing on grammar, vocabulary, pronunciation) to address the problems experienced by students during the problem-solving stage	3,93	1,021	O
13	AP07_05	creating the groups students will be working in during the problem-solving stage	3,48	0,976	O
14	AP07_16	assessing student participation during group work	3,39	1,316	S
15	AP07_01	explaining the principles of the PBL approach to students in preparation for problem-solving	3,32	1,177	S
16	AP07_13	giving solutions to students if they cannot solve the problem	2,98	1,151	S
17	AP07_11	correcting language-related errors during group work	2,82	0,971	S

Overall, they "always" implemented four practices; nine were implemented "often" and four practices were implemented "sometimes". "Asking students to generate possible solutions to the problem" (M=4.59), "introducing students to the problem they will have to solve" (M=4.52),

[7] The means were interpreted based on the following ranges: "Never" = 1.00 - 1.80, "Rarely" = 1.81 - 2.60, "Sometimes" = 2.61 – 3.40, "Often" = 3.41 - 4.20, and "Always" = 4.21 - 5.00.

"providing opportunities for students to present their solutions to other groups" (M=4.39) and "providing language-related help if required by students during group work" (M=4.27) were always used.

In contrast, "Assessing student participation during group work" (M=3.39), "explaining the principles of the PBL approach to students in preparation for problem-solving" (M=3.32), "giving solutions to students if they cannot solve the problem" (M=2.98) and "correcting language-related errors during group work" (M=2.82) were the practices the respondents engaged in only sometimes.

Overall, the majority of the respondents – approximately 89% – were either satisfied or very satisfied with the use of PBL in their classes. Only one person expressed dissatisfaction and four were neither satisfied nor dissatisfied.

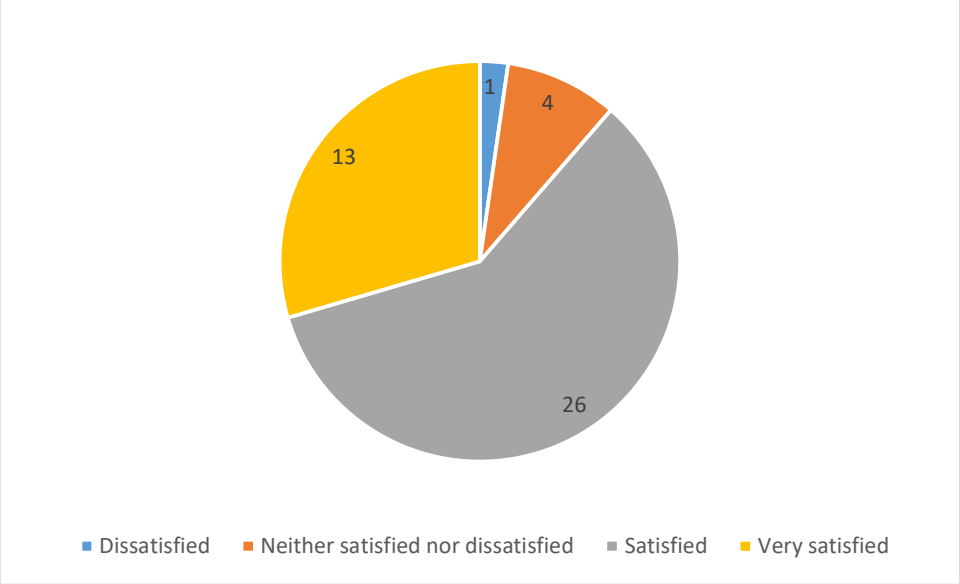

Figure 4.6: Participants' satisfaction with the use of PBL

4.3. Beliefs about the benefits and challenges of using PBL in ESP in higher education

The respondents strongly agreed or agreed with all eight statements pertaining to the benefits of the approach for students; however, the following three statements seemed to resonate the most (M≥4.50), namely PBL can help learners to "develop collaborative working skills" (M=4.55), "higher-order thinking skills" (M=4.52) and "soft skills" (M=4.50).

Table 4.3: Participants' beliefs about the benefits of PBL for students

	Statement	The use of PBL in ESP courses in higher education can help students to ...	Mean	SD	Interpretation
1	AP02_04	develop collaborative working skills	4,55	0,589	SA
2	AP02_01	develop higher-order thinking skills	4,52	0,549	SA
3	AP02_02	develop soft skills	4,50	0,591	SA
4	AP02_03	learn to take more responsibility for their learning	4,48	0,664	SA
5	AP02_06	develop proficiency in English	4,43	0,661	SA
6	AP02_05	develop research skills	4,39	0,689	SA
7	AP02_07	develop more confidence to use English	4,39	0,618	SA
8	AP02_08	acquire subject specific knowledge	4,20	0,668	A

The second part of this section examined general benefits of PBL. Here too the respondents strongly agreed or agreed with all eight statements. The statement according to which PBL can "increase student motivation" had the highest mean score (M=4.41). In contrast, the statement the respondents agreed the least with concerned PBL's potential to "foster meaningful communication outside of class" (M=3.70).

Table 4.4: Participants' beliefs about general benefits of PBL

	Statement	The use of PBL in ESP courses in higher education can help to ...	Mean	SD	Interpretation
1	AP03_05	increase student motivation	4,41	0,658	SA
2	AP03_01	foster meaningful communication in class	4,39	0,579	SA
3	AP03_04	prepare students for future jobs and / or academic careers	4,36	0,650	SA
4	AP03_07	help meet course outcomes	4,36	0,574	SA
5	AP03_08	improve class atmosphere	4,34	0,645	SA
6	AP03_03	improve student participation in class activities	4,30	0,594	SA
7	AP03_06	foster interdisciplinarity	4,20	0,765	A
8	AP03_02	foster meaningful communication outside of class	3,70	0,851	A

Lastly, the respondents were asked to choose three main challenges of the approach from the student and teacher perspectives from the options suggested (12 and 18 items respectively). In the first group, "A lack of experience with taking responsibility for their own learning", "workload involved" and "a lack of experience with reflection" were selected most often (26, 19 and 18 times respectively). With regard to the challenges for teachers, workload was the main concern (as selected by 21 respondents), followed by the integration of PBL in the assessment process (13) and the "development of suitable teaching and learning materials" (12).

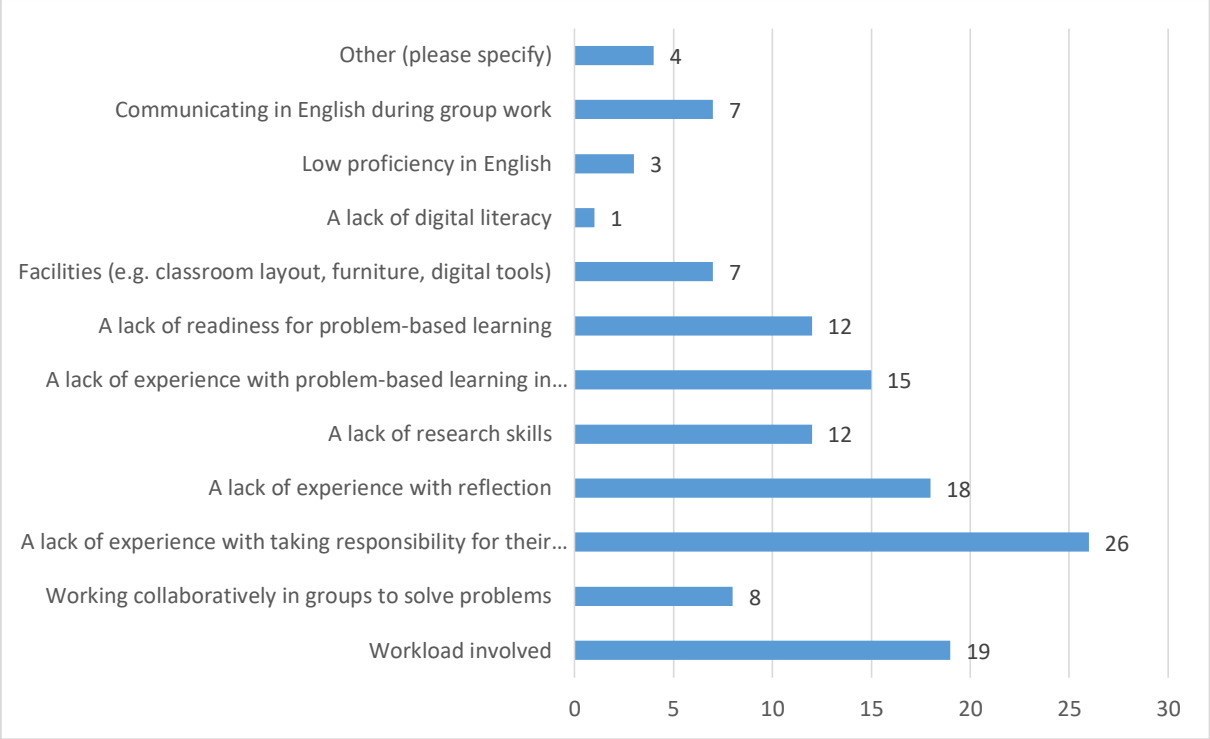

Figure 4.7: Main challenges with PBL for students

Figure 4.8: Main challenges with PBL for teachers

4.4. Need for training events on PBL

Lastly, the respondents were asked about their interest in attending PBL teacher training events. The vast majority (36) expressed interest, 5 were not sure and 3 persons were not interested in attending such events.

5. Discussion

Just under 90% of the participants in this survey were satisfied or very satisfied with the use of PBL in their ESP classes. This is in line with the results of other studies (e.g. Anthony & Kadir, 2012) where language teachers reported overall positive experience with the approach. Overall, the respondents strongly agreed or agreed that PBL offers a wide range of benefits for both language learners and the learning process. These include first and foremost its contribution to fostering collaborative, higher-order thinking and soft skills, which supports the views expressed in the literature concerning the potential of PBL for nurturing graduates that are ready for the challenges of the workplace.

They also considered the approach particularly helpful for fostering student motivation and meaningful communication in class. On the other hand, while they still agreed that PBL can foster interdisciplinarity and meaningful communication outside of class and help learners to acquire subject-specific knowledge, their agreement on these three benefits was less strong.

Despite significant teaching experience and overall satisfaction with the approach among the respondents, the vast majority expressed interest in teacher training events on PBL. Therefore, the following discussion focuses on those survey findings that may be particularly relevant for facilitating a wider implementation of PBL in ESP tertiary-level settings via teacher training and continuous professional development. These include: gauging student readiness, teacher attitudes towards the nature of problems in PBL and lastly, assessment.

5.1. Gauging student readiness for learner autonomy

The respondents generally agreed that PBL should support the development of learner autonomy in its various facets. This is evident in particular from their strong agreement with the statements according to which PBL should involve students taking responsibility for their learning

on the one hand, and teachers acting as coaches / facilitators on the other. In relation to the latter, the participants claimed to always offer language-related help to students during group work if needed, and to provide opportunities for groups to present their solutions to their peers. Moreover, they offered other types of scaffolding on a regular basis, from forming groups and providing the resources needed, through observation during group work, to provision of follow-up activities based on it.

Furthermore, in relation to learner autonomy, the participants agreed that PBL should involve learners engaging in reflection on the process and products of learning as well as peer- and self-assessment. They also found learner-centredness important as they agreed that learner needs and interests should be explored prior to problem-setting.

At the same time, the participants identified students' lack of experience with taking responsibility for their own learning and reflection as two main challenges with PBL. These findings seem to support the calls made in the literature for the need to gauge students' readiness for PBL prior to any intervention (Ansarian & Teoh, 2018; Azman & Shin, 2012). Similar calls have been made in the context of ESP courses and fostering learner autonomy (Hozayen, 2011, p. 115). Consequently, as far as PBL-focused teacher training is concerned, more emphasis could be placed on providing teachers with tools designed to gauge learners' preparedness for learner autonomy and by extension, for PBL. In light of learners' lack of experience with learner autonomy and reflection, another measure to consider may involve placing more emphasis on a gradual approach to introducing PBL, which the study participants appeared to support. Such an approach can be achieved via "semi-problem-based lesson[s]" to be carried out with students before implementing full PBL (Ansarian & Teoh, 2018, p. 19).

5.2. Attitudes towards authentic and ill-structured problems

Whereas the resondents agreed that PBL should pay attention to the problems' cultural and social contexts and involve problems closely aligned with the learning outcomes (see e.g. Ansarian & Teoh, 2018), as well as learner collaboration in (mixed-ability) small groups solely in the target language, they were less convinced about the need to use solely authentic and ill-structured problems. Moreover, they also seemed to sometimes provide students with solutions if they could not solve the problem. Even though identifying suitable problems was not among the top three main challenges selected by them, the respondents' beliefs about the nature of problems to be used merit

further investigation. This is because the general challenges involved in and teachers' unfamiliarity with designing problems are among the main factors that can impede PBL implementation of in EFL contexts (Moslemi Nezhad Arani et al., 2023).

Furthermore, the participants were also undecided if PBL should only rely on authentic materials although traditional teaching materials may undermine the goal of producing "independent learners who can reformulate ill-structured problems, generate hypotheses, seek answers, and ultimately solve these problems" (Ansarian & Teoh, 2018, p.44).

Therefore, teacher training may need to place more emphasis on the nature of problems to be used in PBL and more importantly, providing suitable examples. Currently, PBL-related "databanks" with scenarios that interested language teachers can use and adapt appear to be scarce. With the workload and the development of suitable materials mentioned as two of the biggest challenges in PBL from the teachers' point of view, improving the availability of ESP-relevant problem scenarios seems particularly important to facilitate a wider PBL implementation.

Another solution to the above-mentioned issues may involve greater collaboration between colleagues within language departments and / or subject teachers. Although neither was seen as a major challenge in this study, more of the former can be used to promote the sharing of scenarios, resources as well as assessment material (e.g. rubrics). In addition, since PBL may not be suitable for new teachers (Ansarian & Teoh, 2018, p. 17), more collaboration between experienced and novice educators may help to overcome this difficulty. Further, in light of the agreement among the respondents, according to which PBL should involve collaboration between subject and ESP teachers (with the development of language competence remaining a priority over the acquisition of subject knowledge), a more interdisciplinary approach, as advocated in the literature (see e.g. Neville & Britt, 2007), may be advisable.

The study participants also generally agreed that PBL should involve the use of digital and AI-based tools. With the growing student access to internet-enabled personal devices, learners may find it much easier these days to access resources to research problems. This can also reduce the pressure on teachers to provide relevant resources. Further, it is worth noting that the respondents did not consider PBL to be restricted to in-person teaching. Indeed, studies exploring the use of PBL in online contexts have been on the rise. A recent publication that compared the effectiveness of online and in-class PBL concluded that both were "equally effective in promoting critical thinking skills and dispositions in EFL classroom", while the former was more effective to improve reading

comprehension skills and attitudes towards English (Orhan, 2024, pp. 2351-2352). Therefore, exploring the potential of online PBL in ESP contexts may be one area worth pursuing in teacher training.

Lastly, in relation to teacher beliefs, the participants were undecided as to whether PBL should only be used with students at B1 and higher levels. In Moslemi Nezhad Arani et al.'s (2023) study, the belief that PBL is not suited for all language proficiency levels was identified as one of the main factors that may impede the implementation of PBL. Consequently, teacher training may want to address the question of if / how PBL can be applied in groups of students at lower language proficiency levels to broaden its implementation in ESP contexts.

5.3. Assessment

In general, the participants seemed to follow the main steps of the PBL process as described in section 2.3, from the introduction to the problem and the relevant language as well as activating learners' previous experiences, through asking students to generate and assess the viability of solutions, to assessing group solutions.

However, assessment of student participation during group work was among the practices used only sometimes (alongside explaining the principles of PBL prior to problem-solving and correcting language-related errors during group work) and integrating PBL in the assessment process was mentioned as one of the main challenges. This is perhaps not surprising since PBL assessment has not been addressed much in the literature (Ansarian & Teoh, 2018; Koh et al. 2019) and "the 'what and how' of evaluation in a PBL course is a problematic factor" (Moslemi Nezhad Arani et al., 2023, p. 7). Calls have therefore been made in the literature for PBL-appropriate assessment methods (see Ansarian & Teoh, 2018, p. 46).

In their discussion of assessment formats suitable to foster critical thinking and problem-solving skills, Huba & Freed (2000, p. 224) outline the features of an "exemplary assessment task", understood as tasks that "involve[…] college students in addressing enduring and emerging issues and problems that are ill-defined and of current relevance in their disciplines". In their view, such tasks should be "valid" (i.e. measure multiple learning outcomes), "coherent" (require students to demonstrate the very skills or output they are supposed to develop / deliver), "authentic" (mirror real-life ill-structured problems), "rigorous" (involve declarative, procedural and metacognitive knowledge), "engaging" (be interesting and motivating), "challenging" (promote (interdisciplinary)

learning), "respectful" (be fair, accommodate different learning styles and approaches to problem-solving and in addition, foster the use of language skills) and "responsive" (allow for constructive feedback and self-assessment and make use of assessment rubrics shared with students) (Huba & Freed, 2000, p. 224 -227).

As can be seen from this list, PBL assessment is challenging and in light of this study's results, teacher training may want to focus on this particular stage of the process, including the question of how (and if) student participation during group work should be assessed. According to Kosel (2005, p. 52), PBL assessment in ESP contexts should be two-fold and include product and process "strands". While the former focuses on group work output, the latter should address "the quality of students' involvement in the learning process in terms of their contribution to the learning process and personal improvement" (Kosel, 2005, p. 62) and can take the form of self- and peer-assessment (e.g. via confidential peer-assessment checklists). As argued earlier in this paper, the sharing of ESP-relevant material such as assessment rubrics and checklists via PBL "databanks" and among teachers can help to address this issue further.

6. Conclusion

In spite of a relatively small sample and the fact that most of the respondents were based in just two countries, the findings appear to provide valuable insights into ESP teachers' approaches to and beliefs about the use of PBL in tertiary settings. PBL, which is characterised by "[p]roblem creation, self-directed learning, collaboration, facilitation, reflection, and integration" (Ansarian & Teoh, 2018, p.23), provides significant flexibility to teachers as it involves "no fixed approach" (Ansarian & Teoh, 2018, p. 48). At the same time, despite this flexibility, PBL literature advocates using real-life ill-structured problems. This principle, however, appears to have found less resonance among the respondents. To understand the reasons for this discrepancy, additional research via qualitative methods such as interviews may be helpful.

The findings of this study seem to largely echo the view that PBL may pose multiple challenges including "a lack of proper teacher training and appropriate teaching materials, finding the right assessment method, and difficulty in adapting to a different educational approach on the parts of both teachers and learners" (Ansarian & Teoh, 2018, p.49). Among the challenges identified in this study, students' readiness for learner autonomy, the workload involved for both teachers and students, identifying suitable teaching and learning materials and assessment-related issues stood

out. However, in light of the high satisfaction levels among the respondents, it is likely that with appropriate support such as teacher training and the sharing of good practice, these challenges can be overcome to ensure a wider implementation of PBL in tertiary ESP courses.

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