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Implementing Hybrid Problem-Based Learning in an English for Specific Purposes Context

Dentistry Students' Perceptions and Challenges

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Abstract

Problem-based learning (PBL) has been a practical approach in higher education, enhancing collaboration, critical thinking, and problem-solving skills. It has been primarily implemented in medical and dental education, yet research on its use in English for specific purposes (ESP) courses is limited. This study investigates the implementation of PBL in an online ESP course designed for senior dentistry students at a state university in Turkey. The primary aim is to investigate students' perceptions of PBL, its effects on students' problem-solving abilities, professional preparedness, and the challenges they face. A qualitative research design was adopted, utilizing reflection reports and focus group interviews to collect data from 68 dentistry students. Findings display that students generally perceive PBL as beneficial in enhancing autonomous learning, taking responsibility, research skills, academic language, and collaboration. However, they also faced limited access to resources and coordination difficulties. The study highlights the feasibility of implementing hybrid PBL in large classes and emphasizes the need for well-organized

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support systems. Improving access to digital resources, incorporating hybrid instructional models, and further research on the long-term impact of PBL are suggested.

Keywords: Problem-based learning; English for specific purposes; Dentistry students

Introduction

Higher education has increasingly highlighted fostering critical thinking and higher-order cognitive skills in recent years. The higher education curriculum, then, should foster an analytical, creative, and inquisitive mindset in students while developing their intellectual and creative abilities, problem-solving skills, communication skills, and the ability to integrate theory and practice in their field of study.

In the 1960s, problem-based learning (hereafter, PBL) was initially applied to medical education. As it acquired a reputation and credibility in medical education, PBL began to be used in other health disciplines, such as dental education, environmental health, and nursing education, as a component of entire curricula and as an instructional method within traditional curricula (Anthony, 2010). PBL is an instructional method designed by Cockrell and Caplow (2000) to integrate theoretical concepts with practical applications.

Many higher education experts and researchers from several disciplines revealed several advantages of PBL. For instance, Biggs (2003) and Ramsden (2003) advocate the PBL approach, which motivates students to take a deeper approach to learning rather than traditional approaches that rely mainly on memorization with little comprehension. Idrus and Abdullah (2018) further contributed to this argument, stating that PBL, as an inductive learning strategy and team-based approach, enables learners to develop soft skills for higher education. These skills involve inquiry-based, autonomous, and peer-directed learning, yielding enhanced self-esteem, empowered feelings of becoming active learners, and the ability to collaborate in teamwork.

Recent research has highlighted the effectiveness of online PBL in developing students' communication skills, decision-making abilities, and self-directed learning. Li et al. (2024) conducted a comparative study on online versus face-to-face PBL in dentistry. They found that while face-to-face students attended more in the lesson and reported group dynamics, online learners demonstrated significant improvements in self-directed learning, peer interaction, and

communication skills. These findings emphasize the potential of online PBL to foster essential skills necessary for academic and professional success.

Lim and Chen (1999) argue that many institutions are increasingly changing their instructional methods to encourage independent lifelong learners and active learning. Techniques such as cooperative student projects, simulations, case studies, technology-enhanced learning, discussion groups, and problem-based learning are widely adopted to align with the ever-evolving education landscape. Given the benefits of PBL, incorporating it into an English for Specific Purposes (ESP) course for dental students appears to be a reasonable and practical approach.

ESP courses have long aimed to develop more effective strategies for teaching and mastering the language in specialized professional contexts (Baştürkmen, 2021). Despite abundant literature about PBL, research on students' experiences with PBL in online ESP courses remains scarce. To this end, this study aims to design and implement the PBL approach in an ESP course designed for dentistry students at a state university in Turkey. The main aim is to equip dentistry students with the necessary skills to deal with the real problems encountered during their studies at the faculty of dentistry and in their future professional lives. By addressing the research gap, this study aims to provide valuable insights to language teachers, researchers, and lecturers in the faculty of dentistry regarding integrating PBL into their instruction. Considering the above-mentioned motivations, this study is guided by the following research questions.

1. How do dentistry students perceive their learning experience with the PBL approach?
2. How does the PBL experience affect dentistry students' problem-solving skills and preparedness for professional challenges?
3. What challenges do dentistry students face during hybrid PBL, and how do they overcome them?

Theoretical review

Tuzlukova and Sihgn (2018) introduce the concept of ‘self-directed learning’ within the PBL framework, noting that it enables students to apply their problem-solving skills to novel and complex situations beyond their current experiences. Nilson (2010) also supports this view, noting that PBL encourages collaborative learning and critical discussion, thereby enhancing students’ problem-solving capabilities. Considering all these advantages, one can summarize the PBL approach as allowing learners to engage with real-world problems related to their professions. Unlike the traditional learning

environment, where students are passive recipients and the teachers are the primary source of knowledge, PBL enables learners to actively seek information and develop 21st-century skills: research, critical thinking, communication, collaboration, and problem-solving skills (Kırkgöz, 2018).

The benefits of PBL in medical and dental education have been highly investigated, and its significance has been highlighted in previous studies. For example, Aldred and Aldred (1998) and Walton et al. (1997) argue that PBL aligns with adult learning theories, emphasizing goal-setting and informed decision-making. Preeti et al. (2013) further highlight that, in addition to problem-solving and critical thinking, PBL enhances cooperative learning, communication, and interpersonal skills—competencies crucial for professional and personal success.

Lim and Chen (1999) clarified how the PBL process has been implemented within a dental course. After finding a "real-life" problem, question, or puzzle, students conduct an individualized study to gain knowledge and skills. Through iterative evaluation and refinement, students integrate newly acquired knowledge with their existing skills, reinforcing their learning in meaningful, practical ways. Recent studies have also emphasized the role of facilitators in PBL. For instance, Imai et al. (2016) explored how dental educators develop PBL cases and found that structured PBL cases were often preferred due to time constraints and concerns about content coverage. However, their research also highlighted that students tend to engage more deeply in the learning process when allowed more autonomy in case exploration.

The role of PBL in ESP and English for Academic Purposes (EAP) has also been explored in the literature. Basturkmen (2006) defines ESP as "preparing learners to use English within academic, professional, or workplace environments" (p.17). Popovska and Piršl (2013) argue that ESP is a tertiary education subject that can help develop learners' language and subject knowledge by employing strategies and approaches that promote both personal and professional growth. Thus, practicing the foreign language and engaging with the subject matter are integrated into a single course. Kırkgöz (2015) demonstrates the effectiveness of PBL in language education, particularly in courses such as Materials Evaluation and Adaptation, where students engage in authentic and subject-specific tasks. Moreover, Grady et al. (2009) note that PBL is now widely implemented in medical and dental curricula due to its ability to develop teamwork, problem-solving skills, and specialized academic knowledge.

Lythovchenko et al. (2022) designed an online PBL course for engineering students and used online vocabulary learning tools such as Quizlet, Learning Apps, Wordwall, and Quiziz. Their findings suggest that the authenticity of problem scenarios significantly enhances vocabulary acquisition and overall

student motivation. Hybrid PBL models, which are also the focus of this study, offer greater flexibility and accessibility for students. A hybrid learning environment is defined as the integration of face-to-face instruction with online activities (Garrison & Vaughan, 2008). This combination aims to maintain both personalized interaction and the socio-emotional support of the physical classroom while enabling flexibility in the digital space. The primary significance of the hybrid model is its capacity to enhance self-regulated learning (SRL). In a hybrid framework, learners can manage their time, select appropriate digital resources, and track their progress (Lobos et al., 2024), while in traditional settings, content and pace are controlled mainly by the instructor. Furthermore, the hybrid model supports the development of digital literacies, which are now considered 21st-century skills (Van Laar et al., 2017). These skills, supported by hybrid learning models, are critical evaluation, digital communication, and online collaboration. Therefore, a hybrid learning program can be a good pedagogical choice for ESP courses as learners become self-regulated and digitally competent problem-solvers, while simulating the multidimensional communication demands of the modern workplace.

Despite its many advantages, PBL has also received criticism. One concern is that PBL can be overly time-consuming and may lack the structured guidance found in traditional instructional methods (Lim & Chen, 1999). The effectiveness of problem-based learning depends not only on the pedagogical model itself but also on several implementation factors, including the quality of problem design, tutor facilitation, and group dynamics (Chan, 2009). Another concern is the assessment within the PBL curriculum, as objective evaluations of the students' analytical and problem-solving skills are hard to standardize. However, many different methods of assessment have been suggested, including objective examinations, written assignments, objectively structured clinical evaluations, clinical proficiencies, staff/peer evaluations, clinical journals, or progress tests (Aldred & Aldred, 1998; Walton et al., 1997) Likewise, Dolmans et al. (2005) claim that while PBL has strong theoretical foundations, its success depends on how well it is implemented. They emphasize the need for better tutor training, improved problem design, and stronger group dynamics to address these challenges. Bassir et al. (2014) conducted a systematic review. They found that while PBL enhances students' perceived preparedness and knowledge application skills, there is insufficient evidence to support its effectiveness in developing clinical hand skills.

In summary, while PBL presents a promising pedagogical approach for ESP and dental education, its implementation must be carefully organized to achieve benefits while addressing the limitations of curriculum design and student assessment.

Method

Research design

This study adopted a qualitative descriptive design guided by the principles of Glaser and Strauss (1967) and Braun and Clarke (2006). Data were analyzed using an inductive thematic approach, incorporating the constant-comparison method to ensure analytical depth. The aim was not to generate a fully grounded theory, but to develop a data-driven conceptual understanding of dentistry students' experiences with hybrid Problem-based Learning (PBL) in an English for Specific Purposes (ESP) context. By adopting an inductive approach, this study allowed themes to emerge directly from participants' experiences rather than applying pre-existing agendas. This exploratory design was selected as there was a scarcity of empirical research on hybrid PBL within ESP dentistry contexts. While the constant comparison method guided iterative coding and category development, the main objective was not to construct a formal grounded theory but to identify recurring themes within participants' reflective journals and focus group interviews.

Participants and setting

The study involved 68 senior dentistry students enrolled in an English for Specific Purposes (ESP) course at the Faculty of Dentistry of a state university in Turkey. Participants were selected through non-probability convenience sampling (Creswell, 2012) as they were readily available and voluntarily agreed to participate. Participants attended theoretical courses and internship training during the study's academic year. The researcher merged online settings and face-to-face interactions for the study. The online learning environment introduced challenges, including large class sizes and limited face-to-face interaction due to the university's use of the "Perculus" platform. This platform did not allow lecturers to see students during live sessions, requiring discussions and meetings to be conducted in writing, with only the teacher allowed to speak. However, students conveyed their messages via writing in the chatbox. However, they could meet once or twice a week face-to-face because they were taking other dental courses, which are subject-specific and offered by the university faculty on campus in a face-to-face format. Thus, the representative of each group organized these face-to-face meetings to maintain the steps of the problem-based learning process. Discussions were held, and the end products (presentations) were designed accordingly. These challenges led to some alterations in the implementation of PBL. Instead of oral presentations, students submitted posters or PowerPoint presentations, which were later shared via Padlet for peer review and discussion.

Instructional design of PBL approach for the ESP dental course

The steps of implementing Problem-Based Learning (PBL) in the online English for Specific Purposes (ESP) dentistry course were displayed to students, as shown in Figure 1 below.

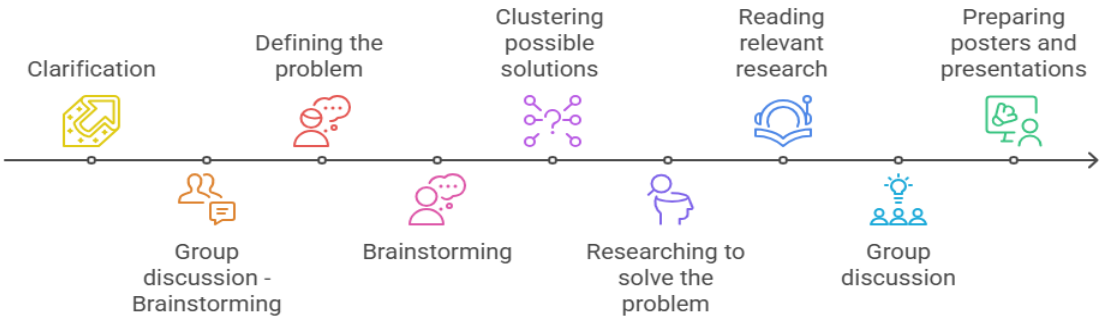


Figure 1. Steps for implementing the PBL experience in the Dental ESP course (napkin.ai).

The steps of the PBL experience were clarification of the problem-based learning, group discussions, brainstorming about the probable problems in the field of dentistry, defining the problem, brainstorming ideas regarding the causes of the problems and possible solutions, clustering possible solutions, researching to solve the problem, individual research, group discussion, and preparing their presentations as the final work. The researcher described each step during the first online class. The steps represented each task within the PBL approach. The whole process was executed in 8 weeks as part of an academic semester.

To execute the steps above, the researcher organized the implementation of the PBL in three key stages: planning, process, and evaluation, and fit the steps mentioned above in an organized framework. Stages are displayed in Figure 2.

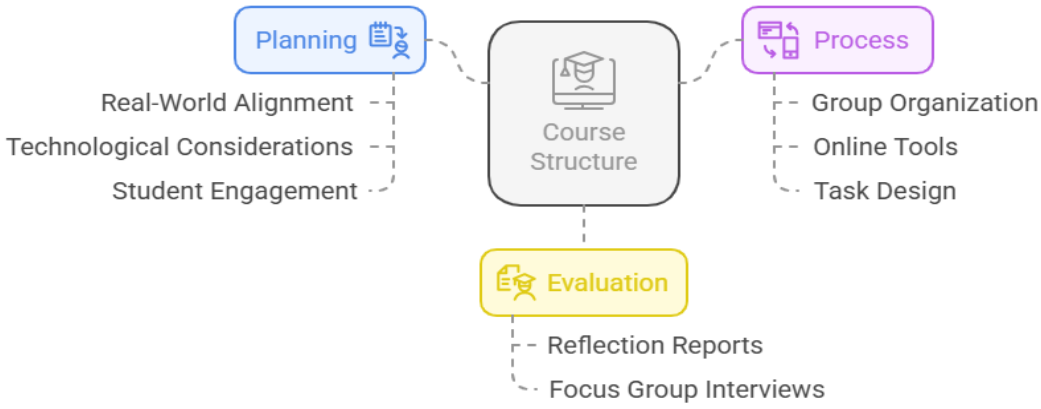


Figure 2. Stages in the organization of Hybrid PBL in the ESP Dentistry Course (napkin.ai).

As shown in Figure 2, the hybrid problem-based learning experience in the ESP dentistry course was designed in three stages. First, the researcher planned the entire PBL experience, considered technological constraints, and determined how to implement the tasks, while also considering students' needs and motivation throughout. The researcher handled the research and collaboration through group work. Finally, the researcher evaluated the entire experience and collected students' reflections, which will serve as the data collection instruments for this study. Each stage is explained in detail below.

Planning: The course objectives were set to align with real-world challenges in dentistry. Insights from practicing dentists were gathered to ensure the authenticity of the problems. Anticipated challenges were considered, including technological issues and student engagement in an online setting. The course structure emphasized collaborative learning while integrating digital tools to facilitate group work.

Process: Students were divided into small groups, each selecting a representative to coordinate tasks. Online tools, including Padlet and Perculus, were used to manage discussions and submissions. Due to platform limitations that restricted face-to-face interaction, discussions were primarily written, except for the meetings outside class sessions. Tasks were designed to support research, discussion, and solution development, as evidenced in the final products presented as posters or PowerPoint presentations.

Evaluation: Students submitted individual reflection reports detailing their learning experiences and problem-solving approaches. Additionally, focus group interviews were conducted to assess students' perceptions of the PBL process, challenges encountered, and the effectiveness of online and face-to-face collaboration.

The researcher aimed to engage students in self-directed learning, identify problems in their field from a student's perspective, develop problem-solving skills, collaborate effectively despite the limitations of the online environment, and increase the feasibility of the PBL process in digital learning contexts.

Data collection instruments

Two qualitative data collection methods were employed to examine students' experiences with problem-based learning (PBL) in the ESP course. The first is the reflection form, which participants complete to address key aspects of their PBL experience, including perceived benefits, challenges, group dynamics, professional preparedness, and the effectiveness of hybrid collaboration. A total of 68 forms were collected. The second is two focus group interviews, in which a randomly selected subset of 10 students participated in semi-structured

groups of 5 to provide deeper insights. With participant consent, the interview was audio-recorded and transcribed for analysis.

Data analysis procedure

Data gathered from the reflection reports were analyzed through an inductive thematic approach, incorporating the constant comparison method to ensure the analytical depth. The Constant Comparison Method filters, categorizes, and connects data based on emerging patterns and themes rather than established categories (Dantas-Whitney, 2002; Leong, Joseph, & Boulay, 2010). This method was selected because the primary aim of the qualitative design was not only to describe perceptions but also to generate a conceptual model of how students make sense of the PBL experience through the emergent structure of grounded theory. The Constant Comparison Method enabled the researcher to move between data collection, coding, and categorization, ensuring that the theoretical output was grounded in participants' voices. Analysis was conducted manually and proceeded in four stages:

First, all reflection reports were read multiple times to understand the dataset fully. Reflexive journals, which were used to document the researcher's position as the course instructor, were also used to record analytic notes on the first preliminary interpretations and emerging patterns.

Second, line-by-line coding was conducted to identify the phrases or sentences. Each meaning unit was assigned a descriptive code, such as practical, coordination difficulty, or research skill improvement. To preserve participants' intended meanings, coding remained close to the raw data at this stage.

Third, codes were compared across participants and the data source using constant comparison (Smith, 2008). The Constant Comparison Method was applied here by continuously comparing new incidents within a code to existing categories to refine those categories. Then, similar codes were grouped into broader categories, and overlapping codes were merged.

Finally, categories were synthesized into four embracing themes reflecting the central dimensions of students' experiences: 1. Cognitive Gains, 2. Collaborative and Professional Engagement, 3. Challenges in Implementation and 4. Professional Outcomes.

To foster analytical transparency, qualitative codes were quantified descriptively. Frequency (n) represents the number of participants who mentioned a given code at least once. Frequency counts were calculated from reflection forms only; interview data were used to elaborate on and contextualize themes.

Code frequencies were calculated to assess their salience across the larger dataset in reflection reports (N=68). Numerical information served as a descriptive indicator of how widely a particular perception was shared among participants. In contrast, focus group interviews (n=10) were not subject to frequency counting since the analytic purpose was explanatory rather than distributive. Interviews were used to deepen the interpretation of reflection-based themes and to reveal affective and contextual dimensions of the PBL experience. As Braun and Clarke (2006) emphasize, thematic analysis is a flexible qualitative approach in which quantification may be used when appropriate; however, it is not essential when the aim is interpretative rather than distributional.

The credibility of qualitative research is related to the researcher's reflexivity and awareness of the potential biases (Creswell & Poth, 2018). In this study, the researcher adopted the role of both observer and reflector during the research process. A reflective journal was maintained during the PBL experience to track student-teacher meetings and observations from the online classes. Because the process lasted 8 weeks, the researcher could easily lose track of each session mentioned in the instructional design section above. Besides, analytical decisions, emerging interpretations, and potential assumptions were documented in this journal. To enhance trustworthiness, an experienced qualitative researcher reviewed the coding framework and a subset of the data. Differences in interpretation were discussed until conceptual agreement was reached, which is commonly recommended in qualitative thematic analysis to ensure interpretative consistency (Braun & Clarke, 2006; Saldaña, 2021)

Results

Results are presented under three research questions guiding this study. Reflection reports (N=68) constituted the primary dataset for quantifying codes and themes, while two focus group interviews (N=10) were used to deepen the themes emerging from the written materials. Table 1 presents the thematic structure derived from the reflective reports, and Table 2 presents the results from focus group interviews.

Themes	Codes	N
Cognitive Gains	Problem Identification	42
	Active Learning	38
	Research Opportunities	35
	Critical thinking	20
	Logical Reasoning	16
Collaborative and Professional Engagement	Collaboration	27
	Responsibility	21
	Professional Awareness	12
Challenges in Implementation	Limited Resources	40
	Coordination Difficulties	38
	Stress	28
	Difficulty evaluating solutions	14
Professional Outcomes	Real-life applicability	36
	Problem-solving competence	35
	Stress management skills	16
	Communication skills	12

Table 1. The thematic structure of the qualitative data obtained from the reflection reports.
*N refers to the number of participants who mentioned each issue at least once. Participants could refer to multiple subthemes.

The themes and subthemes that emerged during the focus group interviews are illustrated in Table 2 below.

Theme 1	Theme 2	Theme 3
Professional Learning through Authentic Tasks	English for Academic and Professional Engagement	Logistical Constraints in the Hybrid Learning Context
Subthemes		
Problem-solving skills	Global professional opportunities	Coordination challenges
Faculty Interaction	Access to specialized academic resources	Group size
Cultural Awareness in Dental Practice	Flexible use of L1 and L2	Limited Resources

Table 2. Themes and Subthemes emerged in focus-group interviews.

As Table 2 illustrates, the focus group interviews generated three main themes related to students' engagement with hybrid PBL. These are professional learning through authentic tasks, the role of English for Academic and Professional Engagement, and logistical constraints in the hybrid learning

environment. The subthemes represent the key aspects through which participants described their experiences with the PBL process. The themes and subthemes were identified during inductive thematic analysis as the research questions were addressed.

Research Question 1

How do dentistry students perceive their learning experience with the PBL approach?

Reflection forms indicated that students found hybrid PBL cognitively engaging and professionally relevant. The most salient aspect was problem identification (n=42). Participants emphasized that defining the problem was very significant to developing appropriate solutions. One student noted:

> "Problem-based learning enables us to establish cause-and-effect relationships." (Reflection Form, ST4)

In the focus group interview, one student reported:

> "The biggest benefit of learning based on problems in the field of study is that we made the problems clearer and were able to focus better on the solutions." (Focus Group 2)

Students also highlighted active learning (n = 38) and research opportunities (n = 35), describing the process as requiring independent investigation and engagement with academic sources:

> "The greatest benefit of this subject for me was to research subjects that I had not researched before." (Reflection Form, ST18)

Frequencies for critical thinking (n = 20) and logical reasoning (n = 16) further indicate that students perceived PBL as promoting analytical engagement rather than memorization. One student noted:

> "When the problem is learned by logic rather than memorization, it allows us to make logical analyses in our professional life." (Reflection Form, ST5)

Similarly, a student contrasted PBL with traditional learning environments:

> "When the problem is learned by logic rather than memorization, we learn to analyze each case in our professional life." (Reflection Form, ST21)

Under Theme 2 in Table 1, students emphasized collaborative learning. Collaboration (n = 27) and responsibility (n = 21) were frequently mentioned,

reflecting shared task distribution and collective responsibility. The following excerpt from a student shows the shared responsibility:

> "Problem-based learning is in an environment where many perspectives coexist, enabling all participants to take responsibility." (Reflection Form, ST26)

Although less frequently mentioned, professional awareness (n=12) indicated the connection between learning activities and professional identity development.

The findings revealed by focus group interviews deepened these patterns under the theme 'professional learning through authentic tasks'. Students described the hybrid PBL model as fostering autonomy and intellectual curiosity:

> "When you are the one identifying the problem and researching it, you stay much more curious and engaged with the material. It was nice to have a voice in the lesson finally." (Focus Group 1)

The subtheme *Problem-solving skills* reflected affective engagement beyond procedural participation. Moreover, *Faculty Interaction* emerged as a distinctive focus group element. Students described interviewing faculty members as bridging theoretical English instruction and clinical dental practice, strengthening the perceived authenticity of tasks.

> "The biggest benefit of learning based on problems in the field of study is that we made the problems clearer and were able to focus better on the solutions." (Focus Group 2)

> "I do believe that the solutions we came up with as a group, and the whole process in general, will help me in real-life experiences." (Focus Group 1)

Both data sources indicate that hybrid PBL was perceived as an active, collaborative, and cognitively demanding learning experience.

Research Question 2

How does the PBL experience affect dentistry students' problem-solving skills and preparedness for professional challenges?

Professional preparedness emerged under Theme 4, shown in Table 1 (Professional Outcomes). The most frequently mentioned outcomes were real-life applicability (n = 36) and problem-solving competence (n = 35). Students reported that the PBL process strengthened their ability to approach professional challenges systematically and apply theoretical knowledge in practical contexts. One student noted:

> "The solutions we came up with as a group will help me in real-life experiences." (Reflection Form, ST24)

> "PBL, a small-group teaching approach, requires students to use information to solve a problem, which is more effective than learning by reading or listening." (Reflection Form, ST 54)

> "Students are more active and thus can develop various skills, such as teamwork, problem formulation, information finding, explaining new information to others, and decision-making." (Reflection Form, ST 25)

Participants reported that engaging with authentic problems increased their confidence in handling future professional situations. The emphasis on problem identification (n = 42) and research opportunities (n = 35) further supports the perception that analytical reasoning developed during the PBL process was transferable to professional practice.

The subsequent examples display students' thoughts and reflections about the connection between theoretical knowledge and real-world applications:

> "The solutions we came up with as a group will help me in real-life experiences." (Reflection Form, ST 24)

> "When the problem is learned by logic rather than memorization, it allows us to make logical analyses in our professional life." (Reflection Form, ST 5)

Some students also referred to gains in stress management skills (n = 16) and communication skills (n = 12). One student described becoming more aware of patient communication and managing professional anxiety:

> "We experience controlling both our own stress level and the patient's stress level in case of complications." (Reflection Form, ST 33)

Emerging themes gathered from focus group interviews introduced a conceptually richer framing under the theme English as a 'Professional Resource.' Students explicitly positioned English as a means to access global knowledge and advance professionally. Two subthemes, global opportunity and specialized resources in English, were identified. Students articulated their stance clearly:

> "English is a key that opens the doors to new opportunities. For our professional life as dentists, mastering these journals is required." (Focus Group 2)

Some students predominantly highlighted the advantage of searching both English and Turkish resources. Therefore, the following quotations from group interviews emphasize another recent popular topic, which is translanguaging:

> "Being able to search in both English and Turkish freely gave us the comfort of communicating without anxiety." (Focus Group 1)

> "Though we discussed in English and kept the conversation going in English in the online sessions, having the chance to communicate in my mother tongue in group discussions outside the online sessions made me feel relaxed and helped me understand better." (Focus Group 2)

> "Yes, I learned how to talk about problems that are special to our Turkish culture about dental topics in English, so I feel I can talk about these issues in an international conference." (Focus Group 2)

While data gathered from reflection reports emphasized problem-solving competence, focus groups viewed language as symbolic and a tool for professional life. Students highlighted the difficulty of navigating medical journals, yet recognized mastery of this terminology as essential to their future professional identities.

Research Question 3

What challenges do dentistry students face during hybrid PBL, and how do they overcome them?

Challenges were depicted under Theme 3 (Implementation Constraints). The most frequently reported issue was limited resources (n = 41). Students described difficulty accessing reliable academic sources and clinical data:

> "Access to the right information, especially clinical experience, was difficult." (Reflection Form, ST14)

A focus group participant similarly stated:

> "We could not find enough scientific data about the problem given to us." (Focus Group 1)

Coordination difficulties (n = 38) were also prominent. Students reported challenges organizing meetings due to internships and academic workload. The quotations below display students' perceptions:

> "Access to the right information, especially clinical experience, was difficult." (Reflection Form, ST 14)

> "We could not coordinate well with our group mates, which created problems." (Reflection Form, ST 64)

Stress (n=28) was associated with workload intensity and clinical responsibilities. One student wrote:

> "Both research and discussion workload can put us under stress and psychological pressure. (Reflection Form, ST 7)

A smaller group of students (n = 14) reported difficulty evaluating the adequacy of their solutions in Theme 3, particularly when determining whether proposed interventions fully addressed the identified problem. Within the constraints framework, some students mentioned their preference for traditional instructions.

The quotations that advocate this finding are provided below:

> "We like lectures in large classes because they are the easiest and quickest way to obtain information." (Reflection Form, ST 28)

> "If all my lecturers used this method, I would doubt how objectively they evaluate students." (Reflection Form, ST 45).

Focus group interviews elaborated on these issues under the theme *Logistical Constraints*. Three subthemes were identified: Coordination Challenges, Group Size, *and Limited Resources.* During the interview, participants emphasized that both online and face-to-face scheduling made peer collaboration more difficult. The examples of students' ideas are indicated below:

> "The groups were crowded, and it was difficult to organize discussion sessions outside the class. While the topics were interesting, the logistics of the hybrid setup were our biggest obstacle." (Focus Group 1).

4 of the 10 students in the focus group interviews criticized PBL and focused on its challenges. The quotations from these students' conversations are provided below:

> "We like the lectures in big classes as they are the easiest and the quickest way for us to reach information." (Focus Group 1)

> "As a dentistry student, I think I need only lectures and clinical experience." (Focus Group 2)

> "I think the PBL process is more time-consuming than traditional approaches. Time should be used efficiently." (Focus Group 2)

> "If all my lecturers used this method, I would feel doubtful if they evaluate the students objectively." (Focus Group 2)

Students also suggested improving access to online resources and scheduling support to ease these challenges. Overall, perceived challenges were primarily structural rather than pedagogical.

In response to research questions, reflection reports highlighted cognitive engagement, research focus, and professional relevance as dominant patterns. Focus group interviews corroborated these findings while adding some more dimensions, particularly regarding autonomy, faculty interaction, and the symbolic role of English within the profession.

Discussion

Perceptions of dentistry students about the PBL process

The first research question explored dentistry students' perceptions of their experience with the PBL approach. The findings indicate that students view PBL as a beneficial approach, highlighting its advantages in exposing them to different perspectives and fostering collaboration and active engagement in problem-solving.

Students agreed that problem identification was a critical component, as it helped them tackle the problems they encountered and would likely encounter in their future careers more effectively. This supports Nilson (2010), who claimed that PBL enhances problem-solving skills by systematically analyzing cases and establishing cause-and-effect relationships. Similarly, students believed that PBL prepared them for future challenges by offering exposure to professional problem-solving situations. This finding is consistent with what Preeti et al. (2013) highlighted: that PBL helps medical students make decisions and apply their learning in practical contexts.

As deduced from students' reflective journals, dental students found this process highly practical because seeking solutions to problems related to domain-specific academic courses and their professional lives was perceived as directly relevant. Conducting meetings, engaging in individual research, and collaboratively creating presentations developed their sense of responsibility and increased autonomous learning. This autonomy aligns with socio-constructivist interpretations of PBL, where learners are positioned not as passive recipients of knowledge but as active agents, responsible for inquiry (Hmelo-Silver, 2004). In the present ESP context, autonomy was not limited to task completion but extended to ownership over disciplinary subjects.

Working cooperatively with group members also altered group dynamics. Students approached challenges from multiple perspectives, including

sociological and economic viewpoints, recognizing that some dental problems require broader cultural understanding. Researching diverse topics helped them realize that social education from a sociological standpoint may help remediate some of the problems they encountered. Maintaining dental hygiene should be a cultural norm. For instance, maintaining dental hygiene should be a cultural and social norm, patients should honestly disclose systemic disease at the clinic, and patients should learn how to tackle dental anxiety. They also agreed that economic problems could be solved through rational, grounded educational policies. For example, they expressed in focus group interviews that purchasing educational materials (dental filling materials, dental models) with their financial means was challenging for many students studying at state universities. As students, trying to solve the issues they observed during their education at school, internships, and in the field, from an academic perspective gave them the chance to view problems from a different perspective.

Such multi-perspectival reasoning indicates that PBL in this hybrid ESP format functioned as interdisciplinary reasoning training rather than isolated language instruction. As Hyland (2006) proposed, effective ESP pedagogy should situate language within authentic professional problem ecologies rather than decontextualized linguistic exercises.

Translanguaging within Hybrid PBL

Although students did not explicitly label their practices as translanguaging, their descriptions clearly reflected dynamic shifts between Turkish and English during problem-solving. Students reported searching for sources in both languages, clarifying complex issues in Turkish, and presenting or documenting final products in English. In the focus group interviews, some students stated that they used academic corpora related to dentistry in their sentences, using English and Turkish as a single system. This corroborates what Cenoz and Gorter (2020) also reported: when solving problems, learners transitioned fluidly between L1 and L2 for cognitive clarity. Furthermore, Canlı and Canlı (2023) discussed the interplay between translanguaging and online courses and found that students felt more encouraged and enthusiastic when free to use their first language.

The present findings extend this literature by situating translanguaging within a cognitively demanding PBL framework. The PBL approach demands a significant cognitive load as learners discuss, search for, and find solutions to problems. Specialized knowledge, critical thinking, and diagnostic reasoning are strongly required. Therefore, employing translanguaging within the PBL framework might scaffold learners as they discuss complex issues with peers in L1, then strategically switch to L2 to present final decisions and document the case for reporting. Here, translanguaging did not function as linguistic

avoidance but as cognitive mediation. It was not an anticipated finding in this research; however, it can shed light on further studies of the relations between translanguaging and ESP courses or translanguaging and problem-based learning, as these relations have not been explored.

From a sociocultural perspective (Lantolf & Thorne, 2006), such mediation is expected in complex knowledge construction. Translanguaging in this context acted as a temporary cognitive bridge, enabling deeper engagement with disciplinary content while maintaining English as the final medium of language. Significantly, students continued to label English as essential for professional growth. Rather than weakening L2 use, strategically placing two languages may foster progress in subject-specific courses.

Resistance to the PBL approach

Despite the positive views, some students preferred traditional theoretical instruction. This aligns with Bassir et al. (2014), who highlighted inadequate clinical hand skills in some PBL contexts, and with Dolmans et al. (2005), who noted that problems are often paper-based rather than being based on actual patients (in medical education), reducing their realism and contextual learning potential.

However, in the present study, resistance seemed to stem less from dissatisfaction with problem-based learning itself and more from concerns about efficiency and assessment objectivity. This distinction is important because it suggests challenges to adaptation rather than a total rejection, echoing Fincham and Shuler's (2001) observations on transitional resistance in PBL environments.

Impact of PBL on professional preparedness

The second research question examines how the PBL experience affects dentistry students' problem-solving skills and preparedness for professional careers. Students' views provide essential information about how they believe Problem-Based Learning (PBL) has affected their abilities to solve real-world issues in their future professional careers and during their higher education. Many students thought their suggestions would be helpful in practical situations. For instance, they discussed utilizing technology and evidence-based procedures and applying knowledge to patient care. As PBL was frequently characterized as a skill-development-promoting, transformative learning strategy, students felt better prepared to manage complexity professionally. Similar results were reported by Lim and Chen (1999), who emphasized the long-term advantages of PBL in fostering the development of critical life skills.

Though students mentioned 'critical thinking' skills at a moderate frequency compared to the other categories, one can still admit that the students believe that PBL improves their critical thinking skills to a certain extent. As critical thinking skills are considered 21st-century skills, a study covering students' analytical abilities will prepare them for their future careers. This finding also aligns with Lim and Chen's (1999) study, which found that PBL promotes higher-order thinking and real-world problem-solving abilities.

This finding corroborates the findings of Hmelo-Silver (2004) and Imai et al. (2016). They maintained that PBL increases students' motivation because learning is driven by real-world problems and their personal needs, which fosters students' intrinsic motivation. Likewise, Imai et al. (2016) mentioned that real-world, patient-centered cases make learning more meaningful. Fincham and Shuler (2001) maintained that learning through realistic problems and patient cases improved long-term recall and clinical reasoning, resulting in enthusiasm and higher student motivation.

Challenges of Hybrid PBL

The third research question examined challenges within hybrid PBL. Overall, students reported limited access to scientific resources, coordination difficulties, and scheduling-related stress. Dolmans et al. (2010) similarly argued that logistical constraints may reduce PBL effectiveness.

Crucially, the majority of identified challenges were structural rather than conceptual. Students did not fundamentally reject the PBL model; instead, they highlighted infrastructural barriers such as database access, scheduling conflicts, and group size constraints. Hmelo-Silver (2004) similarly noted that some PBL students struggled with the uncertainty of directing their learning.
Furthermore, managing the end products posed challenges in terms of scheduling and communication, as they had internships that provided hands-on experience with patients. Groups were too crowded, and each group member had a different internship hour, and they did not want to miss the hands-on practice time. Hmelo-Silver's (2004) and Imai et al.'s (2016) studies also noted unequal group participation and the need for more scaffolding from tutors. Students appreciated PBL's interactive and engaging nature compared to traditional teaching methods but acknowledged that it is time-consuming. In the focus-group interviews, students suggested improving access to digital resources and scheduling opportunities by requesting more meetings with the faculty administration to address these issues. Nilson (2010) advocated for integrating support systems to strengthen PBL's effectiveness, which aligns with the students' recommendations. They also proposed using collaborative digital platforms to facilitate group discussions and restructure project coordination. Concerns about time consumption and assessment fairness were

also similar to Aldred and Aldred's (1998) critique of efficiency in standardized contexts. Likewise, Fincham and Schuler (2001) argued that converting a traditional program to PBL required a complete restructuring of the learning materials, assessment methods, and faculty training.

These challenges suggest that institutional support mechanisms may significantly mediate the success of hybrid PBL implementations. If the PBL approach is introduced within the ESP curriculum designed by the faculty, the administration could plan the internship hours, research work, online classes, and face-to-face meetings more efficiently; otherwise, the whole PBL design becomes the ESP instructor's personal choice, and the instructor and the students try to find the most feasible solution to handle the PBL process. As Dolmans et al. (2005) also emphasized, successful PBL requires institutional alignment, tutor preparation, and access to relevant materials.

To sum up, dentistry students generally view hybrid PBL as a valuable educational approach that fosters research skills, collaboration, and professional preparedness. More importantly, the findings suggest that hybrid PBL in ESP contexts strengthens the relationship between language, cognition, culture, collaboration, research skill development, and professional identity. English was seen as the language of research and professional life. However, translanguaging functioned as cognitive mediation, scaffolding students during their face-to-face group discussions, and the reinterpretation of problems emerged as the primary perceived benefit. Therefore, this study primarily demonstrated the feasibility of implementing hybrid PBL in large ESP classes and also contributed to the field of applied linguistics by illustrating how subject-specific literacy, translanguaging, and problem-based learning intersect within professional education. Finally, addressing challenges such as resource limitations and coordination issues would further enhance the effectiveness of this learning approach. Finally, addressing structural challenges such as resource limitations and coordination issues would further enhance the sustainability and effectiveness of this pedagogical model.

Conclusion

The findings of this study highlight the potential of hybrid Problem-Based Learning (PBL) to enhance dentistry education by fostering critical thinking, collaborative problem-solving, and professional awareness. Its success, however, depends on institutional support and access to resources. By framing PBL as a mediating bridge between language learning and professional and academic fields, this study contributes to ongoing discussions in ESP course design.

In an English for Specific Purposes (ESP) course offered in the faculty of dentistry, students demonstrated how PBL bridges theoretical knowledge with practical application, equipping them with strategies to tackle complex academic and professional challenges. This result aligns with previous research, showing that PBL fosters logical reasoning and teamwork (Lim & Chen, 1999) while preparing students for real-world decision-making (Preeti et al., 2013). Additionally, findings suggest that students naturally engage in translanguaging, using their native language (Turkish) and English for research, discussion, and problem-solving. This helped them grasp complex concepts and navigate academic discourse more effectively.

Despite these advantages, certain challenges of the PBL experience must be considered. Issues such as limited access to academic resources, time constraints, and coordination difficulties posed challenges for students, while some preferred traditional instructional methods and expressed concerns about assessment objectivity.

To maximize the benefits of PBL while addressing its limitations, educators and institutions should provide students with access to comprehensive digital libraries, clinical tools, and other resources to alleviate the frustrations caused by information scarcity. Structured schedules and collaborative digital platforms could ease time management and coordination issues, while a hybrid curriculum integrating both PBL and traditional instruction could accommodate diverse learning preferences. Furthermore, training ESP instructors to facilitate PBL sessions can ensure students receive structured guidance.

While this study provides valuable insight into the efficacy of hybrid PBL in an ESP dentistry context, some limitations remain. First, participants were drawn from a single context within a single faculty of dentistry. This means that the findings may not be directly transferable to institutions with different curricular structures, student profiles, or technological infrastructures. Second, the study relied primarily on self-reported perceptions collected through reflection reports and focus group interviews. While these data sources provided rich insights into students' experiences, they do not necessarily reflect measurable improvements in language proficiency, clinical competencies, or problem-solving performance. Future studies may complement qualitative findings with performance-based or longitudinal assessment measures. Third, this study did not use an experimental design with a group of students with traditional, non-PBL experience. Therefore, although the results indicated the benefits of hybrid PBL, no significant differences were observed between the two groups (control and experimental). Next, the study was conducted over one semester, which was a limitation. Studies over extended periods would investigate knowledge

retention from PBL and skills transfer across the program's different academic and clinical settings. Finally, because the course instructor also served as the researcher, the interpretation of the data might be influenced by personal biases. While using reflexive journals or expert opinion enhanced the credibility of the analysis in this study, future studies may benefit from independent researchers analyzing to minimize potential bias further.

Pedagogical implications

The findings suggest several pedagogical implications for ESP instructors working in diverse professional disciplines. First, integrating problem-based learning into ESP courses can create opportunities for students to engage with authentic disciplinary problems while simultaneously developing language and research skills. In this study, students reported that discussing real-life dental cases increased their engagement and encouraged them to investigate academic sources independently.

Second, the results indicate that allowing strategic translanguaging practices may support cognitive processing in complex tasks. Rather than restricting students to English only, instructors may consider allowing flexible movement between L1 and L2 during collaborative problem-solving, while maintaining English as the primary language of presentation and documentation.

Third, the hybrid model used in this study highlights the potential of combining digital platforms with face-to-face collaboration in ESP courses. Online discussion spaces and collaborative platforms can facilitate peer interaction, while in-person meetings may support deeper problem analysis and group coordination.

Institutional implications

At the institutional level, the findings highlight the importance of providing adequate organization to implement PBL in ESP courses. Students identified limited access to scientific resources and scheduling constraints as significant challenges. Universities may therefore consider expanding digital library access, integrating discipline-specific corpora, and coordinating schedules between language courses and professional internships.

Furthermore, faculty development programs may help ESP instructors acquire the necessary facilitation skills required for PBL implementation. As PBL shifts the instructor’s role from knowledge provider to learning facilitator, training in collaborative task design and group management may enhance the effectiveness of this instructional model.

Implications for further research

Future research should investigate the long-term effects of PBL on clinical competencies and its role in professional identity formation. Comparative studies between PBL and traditional approaches could provide deeper insights into their strengths and limitations, informing curriculum development.

Moreover, integrating AI-driven tools such as bilingual corpora, AI translation models, and digital academic databases could enhance PBL's accessibility in dentistry education. Another critical area for future exploration is the role of translanguaging in ESP-PBL instruction, particularly in professional disciplines like dentistry. A comparative analysis of monolingual (English-only) and translanguaging-friendly PBL environments could determine whether allowing students to use their L1 promotes deeper subject-specific learning and vocabulary acquisition. Further research can integrate and evaluate AI-driven tools, such as bilingual corpora for complex terminology and AI search tools for digital academic databases. Research could evaluate how these tools influence self-regulated learning.

In conclusion, ESP courses prepare students for professional challenges in a rapidly evolving global landscape. By integrating PBL, universities can enhance students' ability to navigate complex subjects, develop professional communication skills, and adapt to dynamic academic and workplace environments. While this study provides valuable insights into PBL's role in dentistry education in a hybrid context, further research is essential to refine its implementation and explore its full potential in ESP settings.

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Appendix A

The list of real-life problems dentistry students generated at the beginning of the PBL process

Real-life problems
• *Posture disorder and pain when working in the wrong positions* • *As the number of school quotas increases every year, it makes finding a job difficult.* • *The impatience of sick people makes the treatment difficult.* • *Communication problems with non-compliant patients* • *The patients' fear of dental treatment makes it difficult for the dentist to treat them.* • *In dentistry faculties, students buy most of the materials to be used for patients with their own money.* • *Failure of prosthesis patients to arrive on the appointment date prolongs the treatment period* • *We cannot benefit from current technologies in the treatment of patients.* • *Dentists are the high-risk group for infectious respiratory diseases during dental treatment* • *Session times are very short because there are too many patients. It is not easy to get good treatment in such a short time.* • *The patients' fear of dental treatment makes it difficult for the dentist to treat them.* • *In dentistry faculties, students buy most of the materials to be used for patients with their own money.* • *Traditional, more challenging treatments are applied to the students in the faculty. We cannot benefit from current dental technologies.* • *As the number of dentistry faculties increases, finding a job in the private sector is not easy. Some people who exploit this opportunity exploit labor by offering newly graduated dentists work at minimum wage.* • *Due to the import of all kinds of equipment used in dentistry, the prices of dental equipment are increasing daily, depending on our country's economy. This makes it almost impossible for us to open a private clinic in the future*

Appendix B

Students' end products uploaded to padlet



https://padlet.com/yyburcak/9nfowabo34p298aj

Appendix C

Samples from final products

Group 6:



Group 10:

GROUP-10

Dealing With Patient's Dental Anxiety

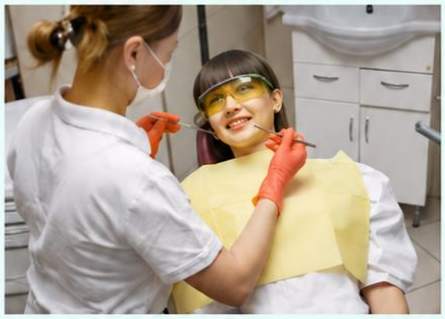


Dental anxiety is a state of intense restlessness that develops with fears and delusions related to dental treatment.

1 In order to reduce the patient's anxiety, we need to tell the patient about the treatment we will do and the situations that he will encounter afterwards. If we explain the treatment in a way that the patient can understand, the level of anxiety will be minimized. And since the patient will be comfortable during the procedure, the treatment is carried out more easily.

2 Dental anxiety occurs in the patient because of the scary and painful stories he hears from his social environment. To avoid this anxiety, the appointment time should be adjusted according to the patient and no action should be taken at the first oppointment.

3 In order to reduce dental anxiety, materials such as syringes and bloody cotton that may trigger the patient's anxiety should not be shown to the patient. In such cases, the dentist may tell the patient to close their eyes and take a deep breath.



4 To overcome dental anxiety, your dentist can create a comfortable environment for you. Maybe there is a music or a picture that relaxes you. Or the dentist can tell you about the procedures he has done. If your dental anxiety is against anesthesia, it can numb you with hypnosis.

5 If you cannot find a way to overcome dental anxiety, you can request sedation or general anesthesia from your dentist. If there is no harm in your health, these will help you a lot in overcoming your fear.

6 Pharmacological methods of treatment:
1) In the sedation; the central nervous nervous system of the patient is suppressed and his consciousness towards the environment is reduced.
2) In the general anesthesia; the patient is completely unconscious, he(she cannot respond to verbal stimuli . Also, the patient is connected to the respiratory support unit.

GROUP-10

