

# Students Perceptions, Satisfactions and Challenges on Problem-Based Learning (PBL): A Survey Study Among Final Year Pharmacy Students

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## Abstract

**Introduction:** Problem-based learning (PBL) is being adopted more frequently in pharmacy education to enhance skills such as problem-solving, and self-directed learning. However, thorough research on pharmacy students' perceptions and satisfaction towards PBL in Malaysia remains inconclusive. This study aims to explore students' views, satisfaction, and obstacles regarding PBL in pharmacy education especially to improve critical thinking, interpersonal skills, and problem-solving skills.

**Method:** A cross-sectional study using a validated closed and open-ended questionnaire consisting of 22 statements was distributed among 84 final-year pharmacy students. **Results:** Eighty-four final-year pharmacy students participated in this study. Findings revealed that the majority agreed with statements on benefits that PBL significantly contributed to their knowledge acquisition (100.0%), stimulated the exploration of basic scientific concepts (98.8%), and enhanced their understanding in selecting both pharmacological and non-pharmacological approaches in disease management (97.6%, 95.2% respectively). The consensus extended to the belief that PBL fostered interactions with peers (91.7%), improved problem-solving skills (95.2%) and enhanced interpersonal skills (95.2%). Students expressed confidence in their instructors' clarity (92.9%) and clear answers to questions (90.5%). Most felt comfortable participating in discussions (69%), and nearly all students were satisfied with their group members' cooperation (95.2%). Although, most findings highlight positive aspects of PBL, this study also identified three major challenges in PBL implementation, namely 1) insufficient time for PBL preparation, 2) lack of teamwork, and 3) difficulty in finding adequate reading materials. **Conclusion:** Overall, these findings highlight positive aspects of the PBL experience among respondents. Future research should consider diverse student populations, conduct longitudinal studies, and explore instructors' perspectives.

## Article history:

Received: 16 May 2024

Accepted: 30 September 2024

Published: 31 January 2025

## Keywords:

problem-based learning  
pharmacy  
education  
students' perception  
satisfaction  
challenges

doi: 10.31436/jop.v5i1.169

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## Introduction

Over the years, employers and professional organisations have urged higher education institutions to produce pharmacy graduates with appropriate competence and knowledge in response to the continuous emergence of newly developed drugs and the ability to keep up with treatment guidelines that are constantly updated. Hence, there is an increased number of educational institutions implementing or planning to implement problem-based learning, including a great number of health science programmes utilising problem-based and/or case-based learning methodologies (Sisternans, 2020). This pedagogical approach has gained popularity in health science programmes particularly due to its emphasis on active learning and the development of critical thinking skills. It encourages students to apply theoretical knowledge to practical scenarios, fostering a deeper understanding of the subject matter. This learning method has been progressively and widely employed in pharmacy schools after the Accreditation Council for Pharmacy Education (ACPE) announced the curricular requirements for pharmacy schools in the year as early as 2000. According to ACPE Standards 2025 (2024), educational outcomes that will be observed include students' foundational knowledge of medications and pharmacy practice, problem-solving abilities, and communication skills. These standards signify the importance of implementing PBL in pharmacy education. Throughout this article, the term PBL will refer to problem-based learning.

According to Yew & Goh (2016), PBL lessons feature small groups of four to eight students collaborating to solve real-world situations called 'clinical cases, and students will do self-study research on their own with little or no supervision from teachers. This approach fundamentally opposes the conventional way of delivering lectures and learning solely from the slides provided. PBL also promotes teamwork and communication skills as students work together to analyse and solve complex clinical cases. Previous studies analysed

several articles on the process of PBL and found that there are promising results when PBL is applied in education (Yew & Goh, 2016; Ibrahim et al., 2018). Therefore, by using this method, students are engaged in the learning process and are able to gain a deeper comprehension of the material as well as critical thinking and problem-solving. Furthermore, positive outcomes were shown in a case study of collaboration between American pharmacy students and three pharmacy schools in Italy which have not yet implement PBL during the research time (Montepara et al., 2021). Although the number of studies approving the PBL method gradually increased, a systematic review of pharmacy education in China found that the PBL approach had not been integrated into the Chinese education system as of 2016. Nevertheless, survey results indicated that most students at these institutions expressed greater enthusiasm for PBL methods when compared to traditional teaching methods (Zhou et al., 2016)

While the existing research supports the benefits of PBL, limited studies have explored students' perceptions, satisfactions, and challenges specifically among pharmacy students, particularly at the advanced stage of their education. This gap in existing studies calls for further investigation to determine the impact of PBL on final-year pharmacy students' learning outcomes and professional development. Thus, this preliminary survey study aims to assess students' perceptions, satisfaction, and challenges related to Problem-Based Learning (PBL) in pharmacy education among final-year pharmacy students.

## Methods

### *Study Design*

This cross-sectional survey study employed an online survey to collect data on students' perceptions and experiences with problem-based learning. Self-administered closed and open-ended questionnaires were distributed, targeting final-year students from the Kulliyyah/School of Pharmacy (KOP) at the International Islamic University Malaysia (IIUM).

### ***Study Subjects***

Final-year pharmacy students from Kulliyyah of Pharmacy, IIUM, were chosen as they have the most exposure to problem-based learning throughout their pharmacy education. Participation was voluntary and anonymous, with informed consent obtained from all participants before data collection. Yamane's formula is used to calculate minimum sample size as seen in Eq. (1). The total population of final-year pharmacy students is 107, calculated with a 5% margin of error, determined a minimum recommended sample size of 84. Accordingly, 84 final-year pharmacy students were selected as study subjects.

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

n = Sample size

N = Population size

### ***Survey Instrument***

The survey questionnaire, developed based on research objectives and relevant literature, included both closed-ended and open-ended questions. Covering demographics, experiences with problem-based learning, and perceptions of its advantages, the questionnaire addressed knowledge acquisition, critical thinking, and clinical competence, along with challenges in implementation. Feedback from the supervisor, co-supervisor, and two expert lecturers in survey research informed the final version.

The questionnaire, designed and published in English, comprised 24 questions divided into four sections:

Section A: Captured socio-demographic background (name, gender and email) of respondents.

Section B: Consisted of 18 items assessing students' perception on of problem-based learning, utilizing a 4-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree).

Section C: Included 4 items assessing students' satisfaction in implementing problem-based

learning, covering aspects such as facilitator, time, and teamwork, using a 4-point Likert scale.

Section D: Featured two open-ended questions exploring students' perspectives on challenges in implementing problem-based learning and their suggestions for improvement in the overall experience.

### ***Ethical Considerations***

Ethical approval for the survey study is obtained from the IREC committee. Confidentiality of participants' responses will be ensured, and all data will be anonymized to protect their identities.

### ***Statistical Analysis***

Statistical Package for Social Sciences programme, version 26.0 (IBM SPSS Statistics for Windows, v.26; IBM Corp, USA) was used to analyse the data. As this is a study of one sample group and the hypothesized population mean is not predetermined, only descriptive statistics were utilised to summarise and describe the main features of the dataset. Responses of strongly disagree and disagree were under disagreement (SD/D), and responses of strongly agree and agree were under agreement (SA/A) as seen in Tables 2 and 3. The mean scores  $\pm$  standard deviations for each item were also tabulated. All p values  $\leq 0.05$  were considered statistically significant.

### ***Thematic Analysis***

An inductive approach was used for the open-ended questions, meaning that the themes are developed from the responses. In general, this method consists of six steps (1) familiarization with data (2) generation of initial codes, (3) searching for themes (4) reviewing themes, (5) defining themes, and (6) final analysis (Braun & Clarke, 2006). The analysis begins with a search for patterns and data that can be identified with each other and combined to form themes. The purpose of this analysis is to explore issues experienced by the students during PBL and how to overcome the challenges.

## Results

### *Instrument reliability and validity*

The content validity of the final questionnaire version was assessed by two lecturers who specialise in survey research. Each lecturer was asked to judge the degree of relevancy using a rating scale objectively and constructively (1 = the item is not relevant to the measured domain, 2 = the item is somewhat relevant to the measured domain, 3 = the item is quite relevant to the measured domain, 4 = the item is highly relevant to the measured domain). The Content Validity Index (CVI) was calculated, and it was found that the S-CVI/Ave for relevancy is 0.88. The results of CVI from two lecturers were greater than 0.80, which is the minimum accepted CVI value for two experts (Yusoff, 2019). Based on the above calculation, it is concluded that I-CVI, S-CVI/Ave meet a satisfactory level, and thus the scale of the questionnaire has achieved a satisfactory level of content validity.

The internal consistency (Cronbach's Alpha) for Section B and Section C is 0.865 and 0.763, respectively. Both values scored above 0.7 and thus, considered reliable (Taber, 2017).

**Table 1:** Demographic data of participants

Characteristics	n (%)
<b>Gender</b>	
Male	23 (27.4%)
Female	61 (72.6%)

A substantial portion of Year 4 students (n=84, 78.5%) actively participated and completed the survey where more than half of the students were female (n=61, 72.6%). Overall, respondents displayed predominantly positive views regarding the integration of PBL into the pharmacy curriculum. The mean scores of students' responses indicated favourable opinions on the effectiveness of PBL (3.36 ± 0.32) and their satisfaction with it (3.24 ± 0.49).

**Table 2:** Student's Perception on PBL (n= 84)

Survey items	SA/A <sup>1</sup> n (%)	SD/D <sup>2</sup> n (%)	Mean ± SD	p-val
PBL can encourage me to study basic scientific concepts.	83 (98.8)	1 (1.2)	3.68 ± 0.495	0.0
PBL can help me gain knowledge	84 (100)	0	3.83 ± 0.375	0.0
PBL can increase my understanding in choosing a pharmacological approach in disease management.	82 (97.6)	2 (2.4)	3.73 ± 0.499	0.0
PBL can increase my understanding in choosing a non-pharmacological approach in disease management.	80 (95.2)	4 (4.8)	3.58 ± 0.585	0.19
I feel satisfied learning by PBL approach.	78 (92.9)	6 (7.1)	3.42 ± 0.625	0.22
I feel more confident expressing opinions.	71 (84.5)	13 (15.5)	3.10 ± 0.670	0.00
I become more interested to learn the topic.	83 (98.8)	1 (1.2)	3.50 ± 0.526	1.00
PBL can help me build interactions with other people.	77 (91.7)	7 (8.3)	3.50 ± 0.649	1.00
PBL encourage me to be cooperative in groups.	81 (96.4)	3 (3.6)	3.61 ± 0.602	0.10
PBL develops student-facilitator interaction.	78 (92.9)	6 (7.1)	3.40 ± 0.661	0.19
I prefer learning by traditional lecture method only.	13 (15.5)	71 (84.5)	1.94 ± 0.812	0.00
I do not like doing assignments in groups.	23 (27.4)	61 (72.6)	2.04 ± 0.898	0.00
PBL increase my knowledge on how to find problems related to drug therapy.	83 (98.8)	1 (1.2)	3.60 ± 0.518	0.09
PBL can increase my performance in clinical reasoning.	82 (97.6)	2 (2.4)	3.54 ± 0.548	0.55
PBL increases my knowledge on how to use clinical practice guidelines for evidence-based recommendations.	84 (100)	0	3.73 ± 0.449	0.00
PBL improve my problem-solving skills.	80 (95.2)	4 (4.8)	3.45 ± 0.629	0.49
PBL can develop my interpersonal skills.	80 (95.2)	4 (4.8)	3.44 ± 0.588	0.35
PBL stimulates individual research related to the topic of the case.	80 (95.2)	4 (4.8)	3.44 ± 0.665	0.41
<b>Overall mean ± SD =</b>			<b>3.36 ± 0.32</b>	<b>0.0</b>

<sup>1</sup>Strongly agree, Agree  
<sup>2</sup>Strongly disagree, Disagree

Table 2 presents the mean scores and standard deviations illustrating students' perceptions of PBL for each item. Notably, all participating students (n=84, 100.0%) believed that PBL significantly contributed to their knowledge acquisition (p<0.001). They expressed consensus that PBL effectively stimulated the exploration of basic scientific concepts (n=83, 98.8%). Additionally, a substantial majority agreed that PBL enhanced their understanding in selecting both pharmacological and non-pharmacological approaches in disease management (n=82, 97.6% and n=80, 95.2% respectively). Furthermore, a significant percentage of students reported increased interest in learning the subject matter (n=83, 98.8%) and acknowledged that PBL facilitated individual research related to the case topic (n=80, 95.2%). The consensus extended to the belief that PBL improved problem-solving

skills (n=80, 95.2%) which indicates a strong majority of participants recognized the effectiveness of PBL in enhancing their ability to tackle problems efficiently. A noteworthy majority (n=77, 91.7%) agreed that PBL fostered interactions with peers and enhanced interpersonal skills (n=80, 95.2%).

However, a subset of respondents expressed reservations, with 27.4% (n=23) disliking group assignments, while a minority (n=13, 15.5%) indicated a preference for traditional lecture methods over PBL.

**Table 3:** Demographic data of participants

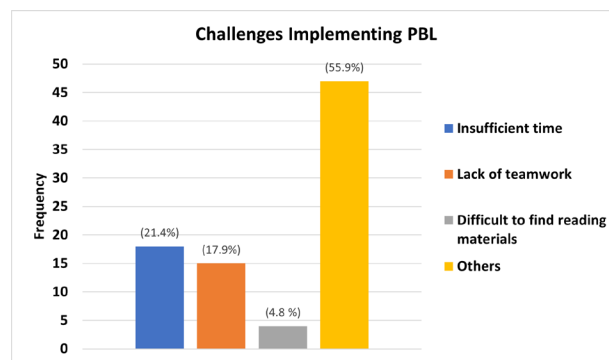
Survey items	SA/A <sup>1</sup> n (%)	SD/D <sup>2</sup> n (%)	Mean ± SD	p-value
The instructor discusses the task clearly.	78 (92.9)	6 (7.1)	3.29 ± 0.593	0.001
The instructor answers the questions presented clearly.	76 (90.5)	8 (9.5)	3.26 ± 0.623	0.001
I am comfortable in voicing out my opinions during discussion.	58 (69)	26 (31)	3.01 ± 0.736	0.000
My group members are helpful in completing the task.	80 (95.2)	4 (4.8)	3.40 ± 0.583	0.138
<b>Overall mean ± SD =</b>			<b>3.24 ± 0.49</b>	<b>0.000</b>

<sup>1</sup> Strongly agree, Agree

<sup>2</sup> Strongly disagree, Disagree

Table 3 provides the results obtained for students' mean scores and SD regarding satisfaction. It was shown that many of the students (n=78, 92.9%) believed that their instructor discussed the task clearly and answered the presented questions clearly (n=76, 90.5%). About two-thirds of them (n=58, 69%) are comfortable in voicing out their opinions during discussion. Almost all students were satisfied with their group members and agreed that they are helpful in completing the task (n=80, 95.2%).

Students' responses to the question were analysed and a total of three major themes were derived from the analysis as shown in Figure 1.



**Fig. 1:** Thematic analysis for challenges implementing PBL

### Challenges in preparing and during PBL

#### Insufficient time for PBL preparation

The predominant challenge identified by respondents when reflecting on the hurdles associated with learning through the PBL method was insufficient time for preparation. In the open-ended section, participants cited various instances of time constraints such as 'Limited time to prepare' and 'Sometimes, lack of time to prepare because schedules were packed with other assignments. Additionally, some students highlighted the difficulty of coordinating schedules with group members, making it challenging to find suitable times for collaborative discussions. This underscores the multifaceted nature of time-related issues, including individual preparation and group coordination.

#### Lack of teamwork

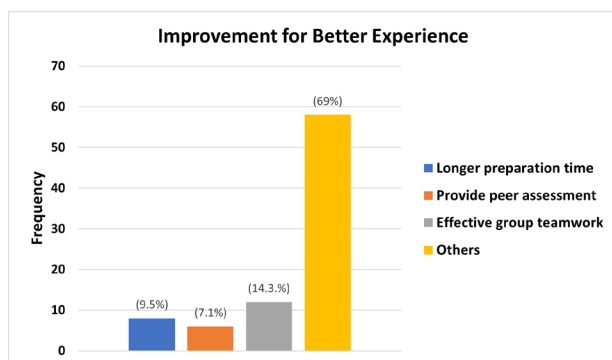
Despite having a high percentage in satisfaction response, a recurrent theme that came up is the lack of teamwork. The usual practice among students is to initially divide the questions among members and each of them will read through the answers in their own time before the presentation. However, some of them expressed dissatisfaction as the members only focused on their part and did not fully understand the whole case study. A respondent also admitted doing that by responding, 'Actually, most of the time when doing PBL, I only understand my part that I was assigned to instead of other questions/parts. Maybe it is because I did not have enough time to understand other member's part. Besides, the group members are not responsive when I want to ask

in WhatsApp group.'

This revelation suggests that, despite overall satisfaction, there exists room for improvement in fostering a more collaborative and comprehensive approach to PBL within student groups.

#### *Difficulty in finding reading materials*

Some participants encountered challenges in locating relevant references, struggling to find answers in available resources. One respondent expressed their uncertainty, stating, 'We were not sure the information we extracted from different sources is related to our questions or not, as we cannot do the discussion with our lecturer beforehand'. Other respondents stated 'Sometimes, it is difficult to search for references' and 'I did not find the answer in any resources'.



**Fig. 2:** Thematic analysis on improvement for better experience

Students' responses to the question were analysed and a total of three major themes were derived from the analysis as shown in Figure 2.

#### ***Student's opinions on PBL improvisation***

##### *Longer preparation time*

As anticipated from the challenges highlighted earlier, a recurring theme emerged, emphasizing the need for extended preparation time. Responses uniformly underscored the necessity for more time to comprehend the case, engage in group discussions, and prepare materials for effective presentation.

##### *Provide peer assessment*

Among various responses, six students mentioned

their desire for peer assessment, reflecting students' interest in offering constructive feedback to their peers regarding their group work performance. This theme suggests a collective eagerness among students to actively contribute to evaluating each other's contributions.

##### *Effective group teamwork*

Students shared that the PBL experience could significantly improve with cooperative, proactive, and supportive group members. Responses highlighted the importance of active participation and communication within the group, with suggestions such as 'Maybe more interaction between each other and speak out when having problems or any dissatisfaction' and 'Everyone has to be prepared on the topic discussed and not covering their part only'.

## **Discussion**

In this study, the consensus among final-year pharmacy students indicates a belief in the effectiveness of PBL for enhancing knowledge acquisition and critical thinking skills. The statistical analysis results underscore the potential of PBL to enhance teaching and learning, particularly by fostering independent thinking, curiosity, and improving interpersonal skills with both group members and instructors. These findings align with previous studies conducted among medical and nursing students (Ibrahim et al., 2001; Putri & Sumartini, 2021), suggesting that PBL is a preferred method for health science education. Likewise, Trullàs et al. (2022) concluded in their study that PBL is superior compared to traditional methods in enhancing students' skills for social interaction, communication, problem-solving, and self-learning. It also does not negatively impact academic achievement, in fact, in many instances, it improves it.

Examining Table 1 data reveals a notable agreement among students, with 98.8% expressing that PBL encourages the study of basic scientific concepts. This aligns with a related study where 89.6% of students perceived PBL as stimulating the learning of basic sciences content (Ibrahim et al., 2018). Additionally, students reported a heightened

inclination toward self-research when assignments are presented with 'real-life cases' in the coursework (Elkalmi et al., 2020). Existing literature supports this, indicating that students are more motivated and interested in learning when PBL is integrated into the curriculum compared to traditional lectures alone (Ibrahim et al., 2018; Joseph et al., 2015). While PBL demonstrates a high potential to enhance the academic performance of pharmacy students, as noted by Galvao et al. (2014), it is important to acknowledge that this method may not necessarily translate into improved professional skills. The study suggests that educators should consider integrating other teaching methods and practical experiences to ensure the holistic development of well-rounded pharmacy professionals.

As depicted in Table 2, most students expressed favourable opinions about the performance of their instructors. These results align with previous studies, emphasizing the significance of instructors undergoing intensive training before program implementation to ensure the successful achievement of objectives (Ibrahim et al., 2018; Elkalmi et al., 2020; Putri & Sumartini, 2021). However, the requirement for additional training could be unfavourable to some lecturers. This has been seen in a study where satisfaction responses from instructors were not as positive as the students and this may be because of the additional workload and lack of administrative support (Trullàs et al., 2022). Instructors equipped with essential skills play a critical role in ensuring the successful implementation of PBL by effectively guiding and facilitating student learning. Their expertise and ability to create a supportive learning environment significantly enhance the overall effectiveness of PBL. These findings underscore the importance of ongoing professional development and training opportunities for instructors to continually enhance their instructional practices in PBL settings.

PBL sessions, like any other teaching style, may have a few disadvantages. As can be seen in Figure 1, students complained of insufficient time for preparation. An earlier study found that students found PBL to be time-consuming (Joseph et al., 2015). Another study also found that pharmacy

students across all academic years consistently brought up the issue of time management during a program that implemented PBL as a learning method (Moseley et al., 2020). It is important to bear in mind that the time allocated to work on the cases in the study is only four days while for this current study, the cases are assigned to students at least a week before the presentation. Nevertheless, Ghani et al (2021) believe that students should know how to prioritise in finishing tasks according to their importance and urgency. In other words, time management is a skill that every student should have to achieve the best result in acquiring knowledge and completing tasks within the time given. This is supported by several studies that found time management behaviours were significantly positively related to the academic achievement of students (Nasrullah & Khan, 2015; Razali et al., 2018). As previously discussed, PBL involves students collaborating with group members to solve cases provided by the instructor. Teamwork is crucial for maximizing the potential of PBL, from task division to presentation day. With advancements in technology, students now have the flexibility to conduct discussions either online or face-to-face. To ensure effective collaboration and prevent "free riders," each group should document brainstorming sessions and record each member's contributions (Sisternans, 2020). Effective teamwork in PBL does not only enhances problem-solving skills but also fosters critical thinking and communication among group members. Teamwork is essential in PBL because it brings together diverse perspectives, promotes collaboration and communication, and utilizes the unique strengths of each member, which ultimately can enhance problem-solving effectiveness and leads to a deeper understanding of the subject matter.

This study also identified that student's ability to access relevant resources to assist in the PBL process was a barrier for some students. Nasr and Wilby (2017) discovered that when PBL is first introduced to a university in Qatar, one of the weaknesses in the PBL process is the availability of resources. Some researchers believed that students should have the skill to obtain and manage learning resources to expand their understanding of the content (Ghani et

al., 2021). Retrieving relevant and high-quality reading materials can be a barrier for some students. Educators should guide students on effective information search strategies and curate suitable materials when students encounter challenges in locating resources that align with their PBL tasks (Joseph et al., 2015).

In terms of recommendations for enhancing PBL, six students expressed interest in peer assessment. They emphasized the importance of constructive feedback among peers regarding group-work performance. This collective eagerness indicates a strong commitment to evaluating each other's contributions. This suggestion aligns with the insights of Ghani et al. (2021), who advocate for providing students with the opportunity to offer constructive feedback on their group members' performance during sessions. Peer assessment not only encourages active engagement with peers' work but also instills a sense of responsibility and accountability within the group. Implementing this approach allows instructors to establish a collaborative learning environment where students can learn from each other's strengths and weaknesses, ultimately enriching their overall educational experience. For future research, it will be beneficial to include instructors' perspectives on students' performance during implementation of PBL as the finding will assist in gaining more insight on the effectiveness of the learning approach. This recommendation had also been applied by previous studies and some interesting points can be found. Antonella (2023) conducted in-depth interviews with two lecturers regarding the benefits of PBL and found that they felt PBL technique promotes teamwork, integrates different domains of knowledge, increases motivation, and improve students' attitudes. Another study in Indonesian private university conducted by Ghufon and Ermawati (2018) revealed that the teachers believed PBL encourage self-directed learning, reducing nervousness, increasing self-confidence and motivation, increasing responsibility, facilitating idea sharing, increasing student engagement, promoting problem-solving, and cultivating a positive learning attitude. Although these studies are not related to pharmacy curriculum, the findings

align with other studies that focused on the the impact of PBL on student learning outcomes.

Despite the valuable insights gained from this study, certain limitations should be acknowledged. Notably, the exclusive focus on final-year pharmacy students may limit the venerability of findings to students in other academic years. Additionally, the study centred on a single pharmacy school, restricting the broader applicability of results to all pharmacy students in Malaysia.

## Conclusion

The study highlights positive student perspectives and satisfaction levels, highlighting the beneficial impact of problem-based learning (PBL) on their educational experience. Despite these positive findings, several challenges persist, including insufficient time for preparation, lack of teamwork, and difficulty in accessing relevant reading materials. To improve the PBL implementation, both students and instructors can overcome these challenges by refining case development, optimizing the process execution, and adopting effective assessment strategies. This iterative refinement process has the potential to consistently enhance the effectiveness of PBL, fostering continuous growth in students' knowledge acquisition and problem-solving skills within pharmacy education.

## Authors contributions

The authors confirm their contribution to the paper as follows: manuscript preparation, study conception and design: E.N.H.E. Z, M. K. S.; data collection: F. D. K.; analysis and interpretation of results: E.N.H.E.Z, K.A.M, F.D.K., draft manuscript preparation: F. D. K. All authors reviewed the results and approved the final version of the manuscript.

## Ethical approval statement (if applicable)

The human study protocol was approved by the IIUM Research Ethics Committee (ID No: IREC



2023-179 and date of approval: 24 Oct 2023).

<http://repository.ikipgribojonegoro.ac.id/461/1/EJ1191701.pdf>

### **Informed consent statement (If applicable)**

Informed consent was obtained from all subjects involved in the study.

### **Conflict of interest**

The author has no conflicts of interest to report.

### **Declaration of generative AI and AI-assisted technologies in the writing process**

During the preparation of this work the author have used Grammarly, Paperpal and Copilot to improve readability and language.

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