



The Association Between the Selection of Learning Resources and the Role of Tutors on the Effectiveness of Problem Based Learning at the Faculty of Medicine Swadaya Gunung Jati University

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KEYWORDS

Effectiveness of PBL, Learning Resources, Role of Tutor.

ABSTRACT

Problem-Based Learning (PBL) is a widely used educational method in medical education aimed at fostering active student participation in tutorials. The primary objective of the tutor is to facilitate discussions and encourage every student to contribute. This study aims to understand the association between different learning resources and the tutor's role in the effectiveness of PBL among UGJ medical students. The study utilized an observational, cross-sectional design with a sample of 233 students selected through proportional stratified random sampling. Primary data was collected via questionnaires. The analysis was conducted using the Kruskal-Wallis and Spearman hypothesis tests. The results indicate that 52% of respondents preferred textbooks as their primary learning resource. The Kruskal-Wallis test revealed significant differences in the selection of learning resources concerning the effectiveness of PBL, specifically in motivational aspects ($p = 0.020$) and demotivational aspects ($p = 0.000$). However, no significant differences were found in cognitive aspects ($p = 0.188$). Furthermore, the Spearman test results showed no significant relationship between the tutor's role and the effectiveness of PBL in cognitive aspects ($p = 0.058$), motivational aspects ($p = 0.343$), or demotivational aspects ($p = 0.797$). In conclusion, while differences in the selection of learning resources affect the motivational and demotivational aspects of PBL, the tutor's role does not seem to impact its effectiveness in UGJ medical students significantly. These findings suggest that enhancing the variety and quality of learning resources could further improve student engagement and motivation in PBL settings.

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INTRODUCTION

Problem-based learning (PBL) is a widely implemented method in universities offering professional medical education (Gonzalez-Argote & Castillo-González, 2024). In this approach, students are presented with scenarios reflecting common clinical problems encountered in the community. The objective is for students to analyze and discuss various aspects of these scenarios, such as foundational knowledge, clinical considerations, and social implications. While PBL is recognized as a suitable method for achieving medical education goals in Indonesia, its effectiveness depends on several key factors, including the availability of learning resources and the role of tutors in facilitating student learning. The World Health Organization (WHO) recommends that 40% of time in health sector education be devoted to skill development through innovative, student-centered, problem-oriented, and evidence-based learning methods, where lecturers act as facilitators. PBL embodies these characteristics by encouraging students to critically think, develop problem-solving skills, and acquire essential knowledge (Carbogim et al., 2017). However, despite the broad adoption of PBL, the relationship

between learning resources and tutor roles in enhancing PBL effectiveness, particularly in Indonesia's unique medical education system, remains underexplored. Given the country's distinct educational challenges, such as resource limitations and variability in tutor training, a deeper investigation into how these factors influence PBL outcomes is crucial. This study addresses the gap by examining these variables within the Indonesian context, contributing to a better understanding of how PBL can be optimized in diverse educational settings (Asmayawati et al., 2024).

The Problem-Based Learning (PBL) system was first developed and implemented by the Faculty of Health Sciences at McMaster University in 1969. This method emphasizes the role of tutorial processes where students, guided by lecturers, collaboratively analyze and deepen their understanding of a problem presented through a scenario (module) in a structured sequence to achieve predetermined learning objectives. The Seven Jumps method, which consists of seven stages, is used to facilitate small group discussions: identifying and clarifying difficult terms in the scenario, recognizing problems within the scenario, brainstorming potential solutions, developing the problem into a schema, determining the necessary learning objectives, engaging in self-directed learning, and finally sharing the outcomes of independent learning. However, the effectiveness of this process is influenced by both the quality of learning resources and the role of tutors. Studies have shown that certain types of learning resources, such as interactive materials or digital platforms, can either enhance or reduce the need for intensive tutor involvement by providing students with clearer guidance and independent problem-solving opportunities. To provide a comprehensive understanding, future research should explore how these variables interact and influence PBL outcomes, particularly in contexts where tutor guidance is variable (Gustin et al., 2018).

Problem-Based Learning (PBL) tutorials play a crucial role in shaping the competence of future medical professionals in Indonesia. The core principle of PBL, which emphasizes student autonomy in learning, becomes a key driver for fostering critical thinking and problem-solving skills (Santos-Meneses et al., 2023). The effectiveness of PBL can directly influence student performance, which in turn impacts the quality of healthcare services in the country. By ensuring that tutorials are optimally conducted—where all students actively participate in discussions—the medical education system can better equip students to meet the demands of real-world medical practice. The effectiveness of PBL is determined by four fundamental factors: the students' engagement, the competence of tutors, the quality of scenarios presented, and the relevance of learning resources. Improving these aspects could lead to not only better student outcomes but also drive reforms in medical education, ultimately contributing to higher standards of healthcare quality across Indonesia. Several recent studies have highlighted the effectiveness of Problem-Based Learning (PBL) activities in various universities (Yew & Goh, 2016). For example, a 2020 study at the Faculty of Medicine, Tarumanegara University, demonstrated that PBL discussions significantly enhance critical thinking and engagement among medical students. Similarly, a 2021 study at Baiturrahmah University emphasized that the role of facilitators is a key factor influencing student motivation during PBL tutorials. These findings align with contemporary educational theories on active learning, but this research aims to expand on existing knowledge by exploring how digital tools integrated into PBL environments might further enhance learning outcomes and student participation. By addressing this gap, the study not only complements but also challenges previous research that focuses solely on traditional PBL methods.

The findings from this research can serve as a foundation for students to enhance the quality of their learning in PBL, allowing them to more effectively master the scenarios and problems presented (Tan, 2021a). Despite the growing adoption of Problem-Based Learning (PBL), few studies have explored the interaction between the role of tutors and the selection of learning resources, particularly within the Indonesian context. This research fills that gap by examining these dynamics, addressing the

research problem: "Is there a relationship between the selection of learning resources and the role of tutors on the effectiveness of Problem-Based Learning (PBL)?" The study aims to uncover how these factors influence the effectiveness of PBL, providing fresh insights into their interaction and offering practical implications for improving learning outcomes. Therefore, the benefit of this research is to provide a deeper understanding of the importance of the role of tutors and the selection of learning resources in improving the effectiveness of Problem-Based Learning (PBL). With this research, it is expected that educational institutions in Indonesia can optimize PBL programs by paying attention to key factors such as the quality of tutor guidance and the relevance of learning resources used. In addition, this research can also serve as a practical guide for educators in designing more effective learning strategies that focus on the needs of learners, thus creating a more interactive learning environment that supports the development of independent problem-solving skills.

METHOD

This study is an observational analytical research with a cross-sectional design aimed at analyzing the relationship between the selection of learning resources and the role of tutors in the effectiveness of problem-based learning (PBL). No intervention was provided to the research subjects; the researcher only made observations. The cross-sectional design indicates that all data in this study were collected within the same time frame, ensuring a snapshot of the relationships between variables. The research instruments, primarily questionnaires, were carefully developed and validated through a pilot study to ensure they accurately measure the constructs of interest. The reliability of these instruments was confirmed using Cronbach's alpha to ensure internal consistency. The questionnaire's validity was checked through expert review, ensuring content validity.

The Kruskal-Wallis test was chosen to analyze differences between multiple groups because it is a non-parametric test suitable for ordinal data or data that do not follow a normal distribution—common characteristics of the responses gathered through the Likert-scale questions in this study. Additionally, the Spearman rank correlation test was selected to assess the strength and direction of the relationship between variables, as it is appropriate for analyzing monotonic relationships between non-normally distributed data. These tests are aligned with the study's research questions, enhancing the methodological transparency and rigour of the analysis (Sovacool et al., 2018). This research will take place at the Faculty of Medicine, Gunung Jati Swadaya University, between April and July 2024. The target population includes all Medical Education students at Gunung Jati Swadaya University, with the sample consisting of first, second, and third-year students who meet the inclusion and exclusion criteria.

Data Analysis

Analysis Univariate

This analysis aims to describe the research variables so that it can help the next analysis in more depth.

Analysis Bivariate

This analysis aims to test the research hypothesis and is carried out using a computer program. The variables of learning resource selection and PBL effectiveness it was tested by Wallis risk analysis and continued with the Mann-Whitney test to find out if there was a difference in the selection of learning resources.

RESULT AND DISCUSSION

Characteristics of Research Respondents

Table 1. Characteristics of the Research Subject

It	Variable	Frequency	Percentage
1	Gender		
	Woman	135	58%
	Man	98	42%
2	Force		
	2021	73	32%
	2022	80	34%
	2023	80	34%
	Total	233	100%

In Table 1, it is shown that the frequency distribution of respondents based on female gender is 135 (58%) while for male gender, there are 98 (42%) respondents, of which most of the respondents are female. In the category of frequency distribution generation, there were 73 respondents (32%) for the 2021 batch, 80 respondents (34%) for the 2022 batch, and 80 respondents (34%) for the 2023 batch.

Univariate Analysis

Univariate was used to describe the frequency and percentage distribution of each variable studied, namely the independent variable (learning resources and the role of the tutor) and the bound variable (PBL effectiveness).

Overview of Learning Resource Selection

Table 2. Overview of the Selection of Major Learning Resources

Key Learning Resources	Frequency	Percentage
Text Book	122	52%
Lecture Notes	70	30%
Media Online	41	18%
Total	233	100%

Based on Table 2, it was found that the main learning resources used were textbooks, lecture notes, and online media. Textbooks are the most widely used learning resource as the main learning resource with a frequency of 122 (52%), followed by lecture notes 70 (30%) and finally online media 41 (17.6%).

Distribution of Students' Perceptions of the Role of Tutors

Table 3. Distribution of Students' Perceptions of the Role of Tutors

Role of Tutor	Frequency	Percentage
Good	186	80%
Enough	47	20%
Less	0	0
Total	233	100%

Based on table 3. The results of the overall frequency and percentage distribution of aspects of student perception of the role of tutors were obtained based on the measurement results obtained from 11 questionnaire items. It can be seen that from the total respondents, namely 233 students, 186 students have a perception of the role of tutors with a good category of 80%, while 47 students have a perception of the role of tutors with a sufficient category of 20%, and there is no perception of the role of tutors with a poor category.

Overview of the Effectiveness of PBL in UGJ Medical Students

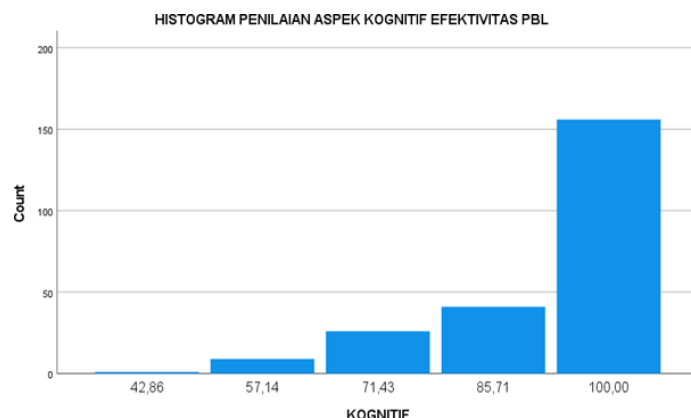


Figure 1. Graph of Cognitive Aspects of PBL Effectiveness

The figure above shows that the assessment of the cognitive aspect of PBL effectiveness is the highest percentage at 100% and reaches 158 respondents out of 233 respondents.

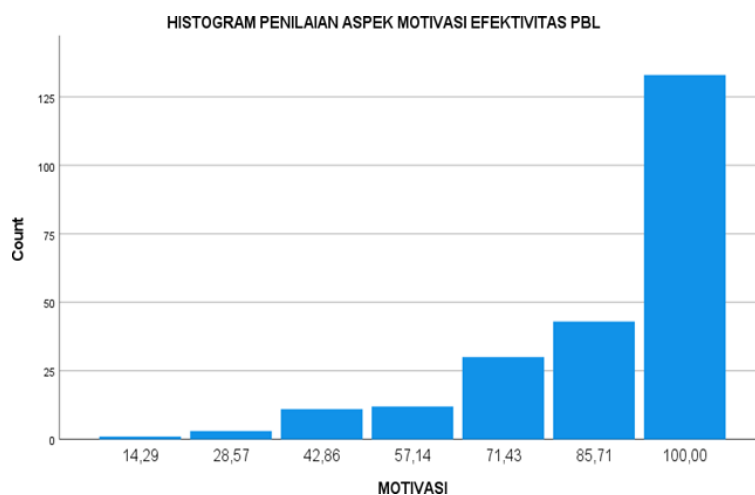


Figure 2. Graph of Motivational Aspects of PBL Effectiveness

The figure above shows that, the assessment of the motivation aspect of PBL effectiveness is the highest percentage of 100% and reaches 137 respondents out of a total of 233 respondents.

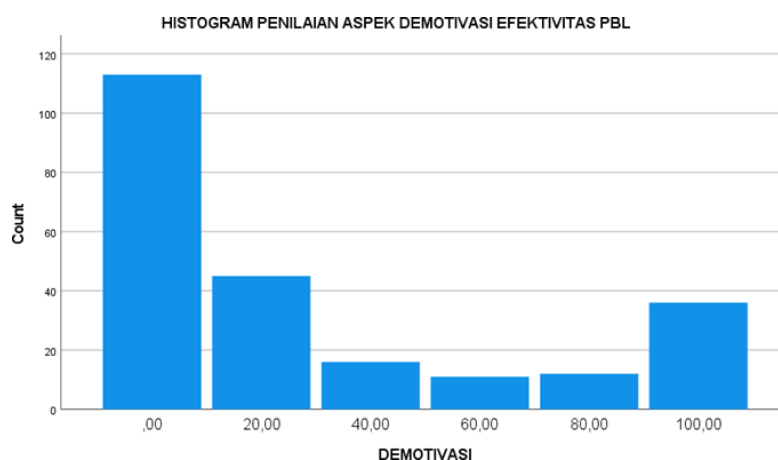


Figure 3. Graph of Demotivation Aspects of PBL Effectiveness

The figure above shows that, in the aspect of demotivation, PBL effectiveness has the highest percentage at 0% and reaches 118 respondents out of a total of 233 respondents.

Table 4. Descriptive Effectiveness of PBL

Aspects of PBL Effectiveness	Descriptive		
	Median	Minimum	Maximum
Cognitive Aspects	100%	42,8%	100%
Motivational Aspect	100%	14,29%	100%
Demotivation Aspects	20%	0%	100%

The effectiveness of PBL is seen in three aspects: cognitive, motivational, and demotivated. The cognitive aspect of PBL effectiveness obtained a median value of 100% (in the range of 42-100%). In the aspect of motivation, a median value of 100% was obtained (in the range of 14-100%). In the aspect of demotivation, a median value of 20% was obtained (in the range of 0-100%). Thus, in the cognitive and motivational aspects that have a positive statement, it is said to be effective if the median value is more than 50%, while the demotivation aspect that has a negative statement is said to be effective if the median value is less than 50%. So it can be explained that the median value in the cognitive and motivation aspects is obtained at 100% (more than 50%), and the median value in the demotivation aspect is obtained at 20% (less than 50%), so it can be said that the effectiveness of PBL is running well.

Bivariate Analysis

Bivariate analysis was used to determine the relationship between the independent variable (learning source and tutor role) and the bound variable (PBL effectiveness) (Ogwen et al., 2021). In this study, the normality test on the effectiveness aspect of PBL was obtained with an abnormal distribution, so the Kruskal Wallis test was used followed by the Mann-Whitney test to determine the difference in the selection of learning resources.

Differences in the Selection of Learning Resources on the Effectiveness of PBL (Cognitive, Motivational, Demotivating Aspects) in UGJ Medical Students

Table 5. Differences in the Selection of Learning Resources on the Effectiveness of PBL

Learning Resources	N	Kruskall Wallis PBL Effectiveness		
		Median (Minimum-Maximum)		
		Cognitive	Motivation	Demotivation
Text Book	122	100,0 (57,14 – 100,0)	100,0 (28,57 – 100,0)	20,0 (0,0 – 100,0)
Lecture Notes	70	100,0 (57,14 – 100,0)	100,0 (28,57 – 100,0)	20,0 (0,0 – 100,0)
Media Online	41	85,7 (42,8) – 100,0	85,7 (14,29 – 100,0)	0,0 (0,0 – 100,0)

Based on the results of the analysis in Table 5, the selection of main learning resources in the form of textbooks and lecture notes on the effectiveness of PBL, the cognitive aspect obtained a median value of 100.0 in the range (57.14-100.0), then in the motivation aspect, a median value of 100.0 was obtained in the range (28.57-100.0) and in the demotivation aspect, a median value of 20.0 was obtained in the range (0.0 – 100.0), while in the selection of the main learning source in the form of online media on the effectiveness of PBL, the cognitive aspect A median value of 85.7 was obtained in the range (42.8 – 100.0), then in the motivation aspect, a median value of 85.7 was obtained in the range (14.29 – 100.0) and in the demotivation aspect, a median value of 0.0 was obtained in the range (0.0 – 100.0). Thus, it can be said that in the selection of the main learning resources in the form of textbooks and lecture notes, there is no difference in the effectiveness of PBL (cognitive, motivational, and

demotivated aspects) while there is a difference in the effectiveness of PBL (cognitive, motivational, and demotivating aspects) in the selection of the main learning resources in the form of online media.

Table 6. Kruskal Wallis Test Results

	PBL Effectiveness	Significance
Cognitive		0,188
Motivation		0,020
Demotivation		0,000

Based on the results of the analysis using the Kruskal-Wallis test, the significance of the cognitive aspect was obtained at 0.188. Motivation aspect 0.020 and Demotivation aspect 0.000. Based on this analysis, it can be concluded that there is no significant difference in the cognitive aspect of PBL effectiveness on the main learning resources chosen, but there are significant differences in the motivation and demotivation aspects of PBL effectiveness on the main learning resources selected. Furthermore, to find out which learning sources have differences in the aspects of motivation and demotivation, the Mann Whitney test is continued.

Table 7. Mann Whitney Test: Selection of Learning Resources on Motivational and Demotivating Aspects of PBL Effectiveness

Learning Resources	PBL Effectiveness	
	Motivation (p)	Demotivation (p)
Text Book – Lecture Note	0,016	0,000
Text Book – Media Online	0,032	0,000
Lecture Note – Online Media	0,839	0,319

Based on the results of the analysis using the Mann-Whitney test, it was obtained that differences in the selection of learning resources influenced aspects of PBL effectiveness. In the aspect of motivation, it is known that there is an influence on the selection of learning resources between textbooks and lecture notes with a significance value of 0.016, and then there is a difference in textbooks and online media with a significance value of 0.032. However, there was no difference between lecture notes and online media because a significance value of 0.839 was obtained. Then, in the aspect of demotivation, it is known that there is an influence on the selection of learning resources between textbooks and lecture notes with a significance value of <0.001, and there is a difference between textbooks and online media with a significance value of <0.001. Meanwhile, in lecture notes and online media, there was no difference because of the significance value of 0.319.

The Relationship of the Role of Tutors to the Effectiveness of PBL (Cognitive, Motivational, Demotivating Aspects) in UGJ Medical Students

Table 8. The Relationship Between the Role of Tutors and the Effectiveness of PBL

Role	PBL Effectiveness					
	Cognitive		Motivation		Demotivation	
	p-value	RHO (R)	p-value	RHO (R)	p-value	RHO (R)
Tutor	0,058	0,124	0,343	0,062	0,797	0,017

Based on the results of the analysis in Table 8, it shows that, in the role of tutors with cognitive aspects, a p-value of 0.058 (more than 0.05) and a rho (r) value of 0.124 are obtained. In the role of tutors with a motivational aspect, the p-value results were 0.343 (more than 0.05), and the rho value (r) was 0.062. In the role of tutors with demotivation aspects, the results of a p-value of 0.797 (more than 0.05) and a rho (r) value of 0.017 were obtained. Thus, the results show that there is no significant relationship between the role of the tutor and the cognitive, motivational, and demotivated aspects.

Overview of the Selection of Learning Resources for FK UGJ Students

The results of this study are in accordance with research conducted by Jameel Tahir et al in 2019 on the preferences of medical students for learning resources, which shows that most students use textbook learning resources in lecture and practicum activities. Meanwhile, one-third of students admitted to choosing lecture note learning resources because of their lack of understanding of textbooks and online journals written in English. This condition illustrates that students often use textbooks as the main learning resource for lecture activities and understanding the material studied because textbooks provide complete information that covers various aspects of a topic studied so as to provide a comprehensive understanding to students, in addition to the preparation of a systematic textbook will make it easier for students to understand the concept gradually.

For example, to understand the etiology of the treatment of a disease, by choosing a textbook related to the topic, students will find relevant and structured discussions so that it is easier to understand the topic being studied. However, some students can also use other learning resources, such as online resources, journals, scientific articles, learning videos, and lecture notes, to complete their understanding and gain a broad perspective (Hew & Cheung, 2014).

The results of this study are also in accordance with research conducted by Shmanee Al Marwah et al in 2024 on Preferences for Medical Student Learning Resources: Physical Resources vs Digital Resources, which shows that most students use textbook learning resources in lecture activities and some use digital books or e-books as materials to repeat learning at the last minute before the exam.

Textbooks are the main learning resource for pre-clinical medical students because the material studied by pre-clinical students concentrates more on the basic concepts of anatomy, biochemistry, physiology, and pathophysiology, these topics usually do not change in a short period of time and are generally more stable than clinical subjects. Therefore, textbooks are often the main learning resource for pre-clinical students because they include reliable information. Meanwhile, students who use digital books because they are related to the price of digital books are relatively cheaper compared to buying textbooks. The selection of learning resources is greatly influenced by access to time efficiency, accessibility, and quality of information; digital resources are often considered more accessible than textbook resources; on the other hand, learning resources are considered to be of high quality if the learning resources are up-to-date and come from reliable sources (Onye, 2016). Learning resources should be concise and direct to the target.

Factors that affect the selection of learning resources for students, including medical students, include access to learning resources, both offline and online learning resources, students tend to choose learning resources that are easy to access, such as journals or scientific articles that can be accessed at the desired time, while students have a habit of looking for textbook learning resources in the library because of easy access. Then, the quality of the content of the learning resources must be discussed thoroughly, and a comprehensive explanation of the material studied must be provided (Karnes & Bean, 2021).

One of the things that is considered in the selection of learning resources is the affordable cost to get these learning resources, free or affordable learning resources tend to be preferred by students (Linoski et al., 2020). In addition, the way of delivering learning resources that allow interaction or stimulation, such as learning videos, will make it easier for students to understand the material being studied. Relevant learning resources in accordance with the learning curriculum will make it easier for students to obtain learning information for academic tasks. In addition, in medical science, which continues to develop, it is very important to choose learning resources that contain the latest information related to the topic being studied. Of the several factors mentioned in the selection of learning resources, it is also necessary to relate to students' learning styles, where students have different learning styles,

such as visual, auditory, and kinesthetic. Therefore, based on the learning style, students will determine effective learning resources according to student needs.

Overview of the Perception of the Role of Tutors on the Effectiveness of PBL at FK UGJ

Based on the results in Table 6, it can be seen that out of a total of 233 respondents, 186 students with a perception of the role of tutors with a good category of 80% then, 47 students with a sufficient category of 20%, while there are no students who have a perception of the role of tutors with a poor category. Thus, most of the FK UGJ students have a good perception of the role of tutors during problem-based learning activities.

The results of this study are in accordance with research conducted by Monika Lodia et al. With the title Student Perception of the Role of Tutors in Problem-based Learning Tutorials at Baiturrahmah University in 2022. The results of the study show that most students have a perception of the role of tutors with a good category. The role of the tutor consists of several aspects, namely, active/constructive aspects, independent aspects, contextual aspects, collaborative aspects, and behavior as a tutor. In this study, most students' active/constructive aspect gets a good perception. This condition illustrates that in the active/constructive aspect of the role of the tutor

PBL is a process where tutors encourage student knowledge development. Tutors can do this by providing directed questions related to the topic being discussed or by inviting students to analyze cases in depth and consider various perspectives so that student understanding is formed and tutorial discussions are more directed.

In the independent aspect, the results of this study are in accordance with the research conducted by Nugroho et al at the Islamic University of Malang in 2021 with the results of students' perception of the role of tutors in the independent aspect, most of which received the good category. The role of tutors in the independent aspect is to encourage students to carry out independent learning and monitor students' independent learning (Gibbs, 2014). By helping students develop critical thinking skills in depth, then the tutor directs students in decision-making based on their understanding so that they are able to increase students' confidence and help in decision-making skills.

So that if the tutor is able to help students find information related to learning, it will produce clear learning goals. Therefore, by setting clear learning objectives, tutors can help create effective and efficient discussion activities so that students have a good understanding of the outcome of the discussion.

In the contextual aspect, the results of this study are in accordance with research conducted by Sunarno Isharyah et al at the Faculty of Medicine, Hasanudin University in 2023. With the results of students' perception of the role of tutors in contextual aspects, most of them get a good category. The role of tutors in the contextual aspect functions as a source of information related to the problems asked by students, based on the theory of the contextual aspect, the tutor is able to understand the material learned and relate it to the context of daily life (Haerazi et al., 2019). To support the contextual aspect, the PBL case given must be relevant to what happened to the patient.

In the collaborative aspect, the results of this study are in accordance with research conducted by Sari Dewi Fadhilah et al at Nusa Cendana University in 2022. With the results of students' perception of the role of tutors in the collaborative aspect, most of them get a good category. The role of tutors in the collaborative aspect serves to provide feedback that builds group members and encourages students to self-evaluate so that students are able to assess shortcomings in the discussion process that must be improved. In addition, the tutor is able to evaluate group cooperation regularly by ensuring that all members of the group participate actively and that no one is left behind. Ensure that discussion groups collaborate effectively so as to produce better and more creative solutions to problems (Tang et al., 2020).

In terms of behaviour as a tutor, the results of this study are in accordance with research conducted by Wildan Satria Nugroho et al. at the Faculty of Medicine, Islamic University of Malang, in 2020. With the research results, the perception of the role of tutors in the behavioural aspect as a tutor mostly gets a good category. Behaviour as a tutor can be said to be good if the tutor is responsible for monitoring group members during the discussion so that each of the group members can play an active role during the discussion (Michaelsen et al., 2023). A tutor is not only silent in observing the discussion but also has the motivation to participate in encouraging students to be active and directing the material being discussed.

Factors that affect students' perception of the role of tutors during the PBL process include the quality of the way tutors interact with students and the ability of tutors to create positive relationships so as to build a discussion process. In addition, the tutor's ability to understand the material being discussed will greatly affect the course of the discussion, a good tutor is able to answer questions from students and apply their knowledge to certain situations when group members cannot solve problems. The tutor also pays attention to the course of the discussion and ensures that all group members play an active role in the discussion process (De Jong et al., 2018). The tutor is able to encourage group members by providing stimuli related to the case being discussed. In addition, the timeliness of the tutor's attendance also affects students' perception of the role of tutors because it will cut the time of the discussion process so that it does not run effectively.

Overview of the Effectiveness of PBL in UGJ Medical Students

Based on the results of the discussion in table 8, it shows that out of a total of 233 respondents in the cognitive aspect, the minimum score was 42.8%, the median value was 100%, and the maximum value was 100%. In the aspect of motivation, the minimum score is 14.29%, the median value is 100%, and the maximum score is 100%. In the aspect of demotivation, it gets a minimum score of 0%, a median value of 20%, and a maximum value of 100%. Thus, in the cognitive and motivational aspects, there is a median value of 100% (more than 50%), while in the demotivation aspect, there is a median value of 20% (less than 50%). Thus, if in the cognitive and motivational aspects, the median value is more than 50%, while in the demotivation aspect, the median value is less than 50%, then it can be said that PBL is running effectively.

The results of this study are in accordance with research conducted by Sandaria Ferri Gusti et al at the Faculty of Medicine, Mulawarman University, in 2022, with the results of all students giving an effective assessment on the cognitive aspect of 96.3%. The cognitive aspect is related to students' knowledge of a topic being discussed, where each group member is expected to understand the topic so as to support the active group members so PBL can take place effectively. The cognitive aspect is very important in influencing the effectiveness of PBL because PBL encourages students to think critically, such as analyzing and evaluating information and making assumptions, which is needed in the PBL process (Ismail et al., 2018).

The results of this study are in accordance with research conducted by Maulana Rifyandi et al. in 2020 on FK students of Baiturrahmah University, showing that PBL discussions there have been effective. The motivation aspect is one of the important roles in the PBL process, where students who have high motivation will be actively involved in learning, actively participate in group discussions and be able to contribute to solving the problem of a case discussed. In addition, motivated students will be able to understand the material more deeply, and they tend to be able to solve problems in detail and will also delve deeper into the cases discussed. Motivated students will be more effective in collaborating with other group members because positive motivation will make them willing to share knowledge with other group members, listen to other group members who have opinions, and be able to work together to achieve a common goal.

The results of this study are in accordance with research conducted by Retno Issroviatingrum et al. in 2021, where the majority of students assessed the effectiveness of PBL in the effective category at 83.4%. The demotivation aspect is a negative aspect that affects the effectiveness of PBL. The demotivation aspect is still related to the student motivation aspect in PBL learning, where the demotivation aspect discusses more things that hinder student learning motivation in participating in PBL activities. Demotivational statements are a form of negative statements.

The discussion on the demotivational aspect is closely related to student motivation, which arises from outside the self or from the extrinsic (Ryan & Deci, 2020). Therefore, motivation that arises from outside will not survive if several inhibiting factors influence it. Factors that hinder the effectiveness of PBL include the material or case provided in PBL is not relevant to the student's interest, lack of preparation in facing PBL discussions, lack of guidance from the facilitator in solving problems during the discussion, there is conflict in the group or dominance by some group members can reduce the motivation of other members and the existence of previous bad experiences such as not being listened to or not appreciated.

The Relationship between the Selection of Learning Resources and the Effectiveness of PBL in FK UGJ Students

Based on the results of the analysis in Table 9, it can be seen that in the selection of the main learning resources in the form of textbooks and lecture notes, there is no difference in the effectiveness of PBL (cognitive, motivational, and demotivated aspects) while there is a difference in the effectiveness of PBL (cognitive, motivational, and demotivating aspects) in the selection of the main learning resources in the form of online media. Then, in Table 10, the results of the analysis of the Kruskal Wallis test were obtained to determine the difference in the selection of learning resources on the effectiveness of PBL, it can be seen that from a total of 233 respondents in the cognitive aspect with a p-value of 0.188, it can be said that there is no difference in the selection of learning resources, while in the motivation aspect with a p-value of 0.020, it can be said that there is a difference in the selection of learning resources, Then in the aspect of demotivation with a p-value of 0.000, it can be said that there is a selection of learning resources. Thus, in the effectiveness of PBL, there are differences in the selection of learning resources in the aspects of motivation and demotivation.

Then, the difference in the selection of learning resources from the aspects of motivation and demotivation will be analyzed using the Mann-Whitney test. Based on Table 11, it can be seen that, in terms of motivation and demotivation, the difference in the selection of learning resources between textbooks and lecture notes with significance values of 0.016 and 0.000 is stated to be a significant difference between textbooks and online media with significance values of 0.032 and 0.000, it is stated that there is a significant difference. In contrast, in lecture notes and online media there is no difference in the selection of learning resources because of the value of significance of 0.839 and 0.319.

In this study, there are no research results similar to the difference in the selection of learning resources on the effectiveness of PBL, but there is a study on the main learning resources used by medical students during lecture activities, namely with the title "Medical Students' Preferences for Learning Resources and Their Learning Habits at King Abdulaziz University, Jeddah, Saudi Arabia"(5) with the results of the textbook research being the main learning resource that medical students widely choose.

The difference in the selection of learning resources can affect the effectiveness of PBL in the selection of the main learning resources in the form of textbooks that present in-depth information and well-structured material content, can help students get a strong theoretical foundation to understand the case scenarios discussed in PBL discussions, textbooks have a clear explanation of material concepts so that the discussion is organized systematically and easily understood, This can help students prepare

and strengthen their understanding of certain topics so that they are better prepared to solve problems during the tutorial process. In the selection of the main learning resource in the form of lecture notes that affect the effectiveness of PBL. Based on research conducted by Wynter L et al, with the title What Learning Resources are Used by Medical Students.

The difference in the selection of learning resources between textbooks and lecture notes from the aspects of motivation and demotivation is due to the fact that the content of textbooks is more comprehensive and in-depth, suitable for motivated students to understand concepts in detail. Students who have high intrinsic motivation or who want to master the material completely are more likely to choose textbooks. While the content of lecture notes is more concise and direct to the subject, it is often used by students who want to get information quickly and efficiently. Students who choose the main learning resource in the form of online media are because students who are motivated to explore topics from various perspectives or get the latest information will prefer online media (Muthuprasad et al., 2021). besides, online media allows students to learn anytime and anywhere, which is very motivating for those who are more flexible in learning.

The Relationship between the Role of Tutors and the Effectiveness of PBL in FK UGJ Students

Based on the analysis results from Table 11, the findings indicate that for the relationship between the role of tutors and cognitive aspects, a significance value (p-value) of 0.058 and a correlation coefficient (r) of 0.343 were obtained. This suggests a weak positive relationship, though it is not statistically significant at the 0.05 level. For the relationship between the role of tutors and motivation, a p-value of 0.343 and a correlation coefficient (r) of 0.062 were found, indicating no significant relationship between these variables. Similarly, for the relationship between the role of tutors and demotivation, a p-value of 0.797 and a correlation coefficient (r) of 0.017 were obtained, reflecting no meaningful relationship. According to the established threshold, a p-value below 0.05 suggests a significant relationship between the variables, while a value above this threshold indicates no meaningful correlation.

This means that this study shows that there is no significant relationship between the role of tutors and cognitive, motivational and demotivating aspects in students with a very weak correlation force (Ersanlı, 2015). Thus, it can be explained that in this study, students have the perception that PBL discussions are effective but are not influenced by the role of tutors.

The results of this study are not in accordance with the research conducted by Irgananda Citra Insany et al. in 2020 on FK students of Universitas Brawijaya, where the results of the F test (sig 0.000) were obtained, which showed the influence of the role of tutors on the effectiveness of PBL. Tutors have an important role in the course of the discussion process; tutors have an influence on the group discussion process, which will ultimately affect the cognitive, motivational, and demotivating aspects of the effectiveness of problem-based learning.

In PBL discussions, tutors do not function as conveyors of information but as facilitators who guide students to develop their critical thinking skills. If students have a good perception of the role of tutors, then students have a good cognitive function towards the material discussed, where during the PBL process, all group members are active in giving opinions, complementing each other's arguments and providing adequate questions to fellow group members in order to gain a deep understanding. In addition, tutors are able to build positive relationships with students to motivate students by showing care, empathy, and support, so students tend to feel motivated (Orsini et al., 2016). They feel supported, which increases their desire to participate actively in PBL. If students' perception of tutors is good, it will reduce things that make the PBL process not smooth, thereby reducing the aspect of demotivation.

Based on research conducted by Hamidy Yulis et al., with the title Factors that Affect Student Participation in the Tutorial Process on the PBL method at the Faculty of Medicine, University of Riau.

It was explained that in some conditions, the role of tutors does not have a significant impact on the effectiveness of PBL, these conditions occur due to various factors, either related to group dynamics or the characteristics of the students themselves.

Students who have high prior knowledge have strong initial knowledge and are relevant to the topic they are studying; they feel more confident and able to solve problems independently. They can more quickly understand the situation, identify problems, and find solutions without much help from the tutor. High learning independence will make them able to search for information, analyze problems, and make decisions effectively without being influenced by tutor intervention. In this condition, even though the tutor only plays a moderate or neutral role, students can still manage the learning process well so that the effectiveness of PBL is not disturbed (O Doherty et al., 2018).

Students with good prior knowledge tend to be more efficient in the problem-solving process, reducing the need for long discussions or in-depth guidance from tutors (Zambrano R. et al., 2019). In PBL groups where the majority of members have strong prior knowledge, discussions will take place faster and more focused so that tutors only need to intervene when absolutely necessary and reduce their role in the overall process. In PBL, strong prior knowledge of students can make the role of tutors less influential on learning effectiveness because students are more independent, less dependent on guidance, and more efficient in problem-solving. However, tutors still have an important role in directing and facilitating learning.

There are several aspects of the role of tutors that support the effectiveness of PBL, including active or constructive aspects, independent aspects, contextual aspects, collaborative aspects, and behaviour as tutors. On the active or constitutive aspect, the tutor actively facilitates discussion among group members by asking open-ended questions that encourage students to think critically and explore various perspectives related to the material being discussed and direct the discussion without giving direct answers but encouraging students to find and solve problems on their own. In the independent aspect, the tutor provides encouragement to students to develop opinions and connect them to the problems discussed so as to direct the tutorial discussion to achieve clear learning objectives (Doyle, 2023a). In the contextual aspect, the tutor is able to understand the material being discussed and relate it to the context of daily life.

In the collaborative aspect of the tutorial discussion, there was a division of tasks with the election of a chairman who was in charge of leading the tutorial discussion and two authors who were in charge of recording the course of the tutorial discussion. The rest act as members in the tutorial discussions. All members must still actively contribute to the tutorial discussion (Fox, 2020). This active contribution can be shown by giving each other feedback or criticism during the discussion process. In this case, the tutor is tasked with ensuring that all members of the group have actively participated in the tutorial discussion. In the aspect of behaviour as a tutor, especially in the aspect of social congruence, it has the most influential role in the student learning process. Social congruence itself refers to the intrapersonal behaviour of tutors, such as the ability of tutors to communicate and empathize with students so that it can form a learning environment that encourages students to exchange ideas openly.

The effectiveness of PBL is influenced by the interaction between three basic aspects, namely students, tutors, and scenarios. Students are the centre of discussion, where they play the role of active learners who are responsible for their own learning process (Doyle, 2023b). Active involvement of students in discussion and problem-solving encourages deeper learning, improves critical thinking skills, and helps them internalize knowledge.

Tutors interact with students in a way that motivates them to think deeper and find solutions on their own. Tutors also manage group dynamics to ensure that all members are engaged and that

discussions remain productive, an effective tutor role can improve the quality of discussions, encourage active participation, and ensure that students stay focused on learning objectives. Scenarios spark discussions among students, helping students to apply their existing knowledge and seek out new information. Relevant and challenging scenarios help students associate theory with practice, deepening understanding associated with problems that occur in everyday conditions (Tan, 2021b).

In addition, there are three aspects of students that greatly determine the effectiveness of PBL discussions, namely cognitive, motivational, and demotivated aspects. The cognitive aspect is related to student knowledge, where students must actively contribute to providing information on their knowledge during the discussion. The motivation aspect is related to the need for students to have motivation from within themselves to learn so that they are able to follow the discussion process well. In addition, the motivation that arises in the group can help fellow members to master the learning material. The last aspect is demotivation, an aspect related to motivation that arises from outside the student and can affect the effectiveness of PBL (Shin, 2018).

CONCLUSION

To strengthen the practical implications of this study, educators and medical institutions should consider incorporating more varied and engaging learning resources, particularly online media and lecture notes, to enhance motivation in PBL environments. Moreover, future research should explore innovative approaches to tutor involvement and its nuanced effects on student learning outcomes, addressing limitations in this study, such as the generalizability of results across different faculties and educational settings.

In PBL effectiveness, students as a whole scored well, with assessments on the cognitive aspect of 100% (42.8% - 100%), the motivation aspect of 100% (14.29% - 100%) and the demotivation aspect of 20% (0% - 100%). For the relationship between the selection of the main learning resource and the effectiveness of PBL, there was no significant difference in the cognitive aspect of the main learning resource chosen, but in the aspect of motivation and demotivation, there was a difference in the selection of the main learning resource chosen, namely between the textbook and lecture note 7071 there was a difference with a p-value of 0.016 and 0.00 then between the textbook and online media there was a difference with a p-value of 0.032 and 0.000 while between lecture notes and media online, there was no difference with a p-value of 0.839 and 0.319. So, it can be said that lecture notes and online media tend to be more effective in determining the effectiveness of PBL in terms of motivation and demotivation. There was no significant difference between the role of the tutor and the effectiveness of PBL in terms of cognitive, motivational, and demotivating aspects. With a p-value of 0.58 from the cognitive aspect, 0.343 from the motivation aspect and 0.797 from the demotivation aspect.

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