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Exploring the Factors Affecting Group Effectiveness in Problem-Based Learning Tutorials: A Qualitative Study

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ABSTRACT

In problem-based learning (PBL) tutorials, group effectiveness is crucial to achieving the learning objectives. Previous studies indicate that students' motivation and cognitive factors affect group effectiveness. However, other factors, such as tutors and issues related to the tutorial process, may also influence on group effectiveness. This study aimed to explore the factors affecting group effectiveness in PBL tutorials from student's perspective. A qualitative phenomenological approach was employed, with data collected through in-depth interviews with 26 undergraduate students from the Faculty of Medicine of Universitas Islam Indonesia (FM UII). The data were analysed thematically, resulting in three categories of factors affecting group effectiveness in PBL tutorials: (a) student self-regulation; (b) the quality of social interaction; and (c) contextual support for cognitive elaboration. All these factors were found to influence the achievement of the group's learning objectives, which is indicator of group effectiveness.

Keywords: *Group effectiveness, PBL, Tutorials, Medical students, Qualitative study*

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INTRODUCTION

Problem-based learning (PBL) is widely implemented in medical faculties worldwide and is considered to have a positive impact on learning. Its benefits encompass a range of soft skills, including teamwork, critical thinking, and self-directed learning. Students who learn through the PBL method also demonstrate strong academic ability (1). However, one previous study has shown no differences in knowledge mastery between students who used PBL and those using conventional methods (2).

PBL was developed based on social constructivism. According to social constructivism, knowledge is the result of social interaction and is shaped by cultural and linguistic context. Culture and language guide an individual in building their knowledge. Without social interaction, individuals lack the resources to build their knowledge. Through collaboration, a learner can develop their cognitive skills, using the interactions, resources and other essential collaborative elements to construct their knowledge (3,4). Social constructivism

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assumes that students actively construct their knowledge rather than passively receive information. Second, it assumes that real experience can serve as a foundation or a primary resource for building new knowledge. Third, it holds that learning occurs in social interaction, meaning interaction and communication between people are part of the social process. Fourth, all aspects of student development—cognitive, emotional and social—are interconnected and collectively contribute to the learning process. Lastly, learning happens in an inclusive social community where each individual's characteristics are respected and used as a basis for collaboration (3).

The primary learning activity in PBL is the tutorial, which incorporates contextual, collaborative, constructive, and self-directed learning elements, developed according to the principles of social constructivism (5). During PBL tutorials, students can develop a sense of competence and become motivated to actively participate in discussions (6). Students are the main subjects in the discussion process of PBL tutorials and are expected to participate actively in the discussion through process and content construction. A superficial discussion process is an indication of dysfunctional groups. The quality of collaborative learning in PBL tutorials is affected by student behaviour, including mutual respect among members, active listening and contribution, assuming a valuable role and responsibility, engagement and enthusiasm, providing constructive feedback, and other characteristics that support a good collaborative process (7).

Tutorial group effectiveness refers to a group's ability to achieve learning objectives through constructive interaction and collaboration. Group effectiveness is influenced by three main aspects: input, process, and output. The input comprises group member characteristics and learning resources, while the process involves interactions among group members to manage resources and achieve group goals. The outputs are measured through indicators such as goal achievement, the fulfilment of group members' needs and the continuity of group work (8). Group function is part of the group process, as it emphasises the actual process and social interaction in collaborative learning. Group function reflects a team's capability to manage communication, conflict and other social interactions in completing a task (9).

A tutorial group with good productivity will be able to achieve the expected learning objectives (9,10). Collaboration involves a well-organised process and the construction of content. The effectiveness of a tutorial group is influenced by the quality of the discussion process and group dynamics, as well as by the students, tutors, and problems that are part of the input and process, as previously explained. Studies of group effectiveness have been widely conducted, but none have examined all aspects related to the quality of tutorial groups. In addition, most studies examining group effectiveness are conducted quantitatively using the tutorial group effectiveness instrument (11), which focuses on student motivation and cognitive factors (12,13), or a self-administered questionnaire, limiting their ability to explore other related factors (14,15). On the other hand, previous qualitative studies have mainly examined the quality of collaboration and group functions (9,16). Most of them also examine specific factors affecting tutorial activities, such as student characteristics (17), tutor performance (6) and the quality of the cases used (18). Previous studies have not specifically investigated the various factors that directly affect the effectiveness of tutorial groups. Therefore, this study aims to identify the factors affecting students' perceptions of tutorial group effectiveness.

METHODS

Study Context

The research was conducted at the Faculty of Medicine of Universitas Islam Indonesia (FM UII), which employs the PBL method as its primary learning approach. The curriculum at FM UII is designed with a knowledge development approach for patient management. The undergraduate study programme consists of four phases: (a) Introduction and Biomedical Science; (b) Pathology of Human Diseases; (c) Management of Human Diseases; and (d) Comprehensive Health Care.

The primary learning activity at FM UII is the tutorial, which is conducted using the Maastricht seven-jump process (19). One case is usually discussed in two to three meetings. The first meeting is a brainstorming phase that involves prior knowledge and the determination of learning objectives (steps 1 to 5 of the seven jumps). Students then conduct self-study (step 6 of the seven-step process) in accordance with the predetermined learning objectives. In the second discussion meeting, students enter the reporting phase (step 7 of the seven jumps), where they discuss and exchange opinions based on their self-study results. If a discussion process is not yet completed, it will be continued in the third meeting. A tutorial discussion process/meeting lasts approximately 100 minutes and is guided by a trained tutor. The tutorial process at FM UII is assessed both formatively and summatively. At the end of each case discussion, a quiz is administered, which contributes to the final course score.

Design

This research employs a qualitative, phenomenological design. Phenomenology is a research design that delves into a phenomenon or experience based on individual awareness. Adopting a neutral view, the researcher approaches informants without assumptions and allows them to express their experiences, thereby obtaining a solid understanding of their perspectives. The researcher should also recognise and understand the context of the experiences studied to obtain accurate and unique results (20).

Participants

The population of this study consisted of undergraduate students of FM UII who were recorded as active students at the time the study was conducted, were physically and mentally healthy and had participated in tutorial activities for at least two semesters. The participants were selected using purposive sampling with maximum variation sampling. The variations in this study included year of study, grade point average, and gender. The grade point average was categorised into three groups: (a) $K < 2.50$; (b) $K = 2.50–3.00$; and (c) $K > 3.00$. In total, 26 students participated in this study.

Data Collection

The data was collected through in-depth interviews with an interview checklist. The interview questions aimed to address: (a) the respondent's experience during the tutorial; (b) the benefits and challenges felt during the tutorial; (c) the group dynamics and role of each group member; (d) the factors that supported and hindered the achievement of

learning objectives; and (e) the respondent's feedback on the implementation of the tutorial activities at FM UII. All interviews were conducted via video call and lasted approximately 50–75 minutes per participant. With participants' informed consent, the interviews were audio-recorded and transcribed verbatim. All transcripts were anonymised to maintain participant confidentiality.

Data Analysis

The research data was analysed using a social constructivist lens through the thematic analysis method (21), which consisted of six steps: (a) data familiarisation; (b) code generalisation; (c) theme determination; (d) evaluation of theme scopes; (e) theme definition and naming; and (f) report writing. To ensure the trustworthiness of this study, the authors applied Lincoln and Guba's criteria, including credibility, transferability, confirmability and dependability. The credibility of this study was established by the authors' efforts to ensure that all conclusions were truly derived from the data. The authors dedicated considerable time to understanding the transcript and ensuring the resulting themes and categories reflected the data. Moreover, the participants in the study were students from multiple years, gathered to triangulate the sample and enhance the study's credibility. To assess confirmability, the authors provided the initial codes to some participants and asked them whether these codes accurately reflected their views. The authors also applied peer review analysis. The initial code was identified by the first author and rechecked by the second author. The identified theme was obtained through discussion between the first and second authors. Feedback from a medical educator, who was also a qualitative researcher, was obtained regarding the theme and the categories derived from the data. Expert participation was part of an effort to increase the dependability of the study. Lastly, to increase the study's transferability, detailed explanations of the research context and research process were provided. This detailed information might assist another researcher who wants to replicate the study (22).

Reflexivity

To minimise the influence of power dynamics, the interview process was conducted by the first author, a student at the institution where the research was conducted. The status of the first author as a student created a linear relationship and reduced the hierarchical gap. Even though the first author was part of the population, the data collection process adhered to qualitative research principles, including neutral probing, reflexivity to avoid individual assumptions and strategies to enhance the trustworthiness of the research. The data was analysed through initial coding by the first author. The second author, who is a lecturer at the same institution as the first author, then reviewed the initial coding. The categories and themes were developed through iterative discussions between the two authors. To minimise social desirability bias, all participants were informed that their participation was voluntary and without consequences and that there was no right or wrong answer, meaning they should share their opinions openly and accurately.

RESULTS

The respondents in this study consisted of 26 students from three classes, comprising 14 females and 12 males (Table 1).

Table 1: Respondent characteristics

Criterion	n	%
Grade		
Year 2	8	31
Year 3	8	31
Year 4	10	38
Gender		
Male	12	46
Female	14	54
GPA		
< 2.5	8	31
2.5–3.00	9	35
> 3.00	9	35

Seven themes were generated from the research data, which were then categorised into three factors affecting group effectiveness: (a) student self-regulation; (b) the quality of social interaction; and (c) contextual support for cognitive elaboration (Figure 1).

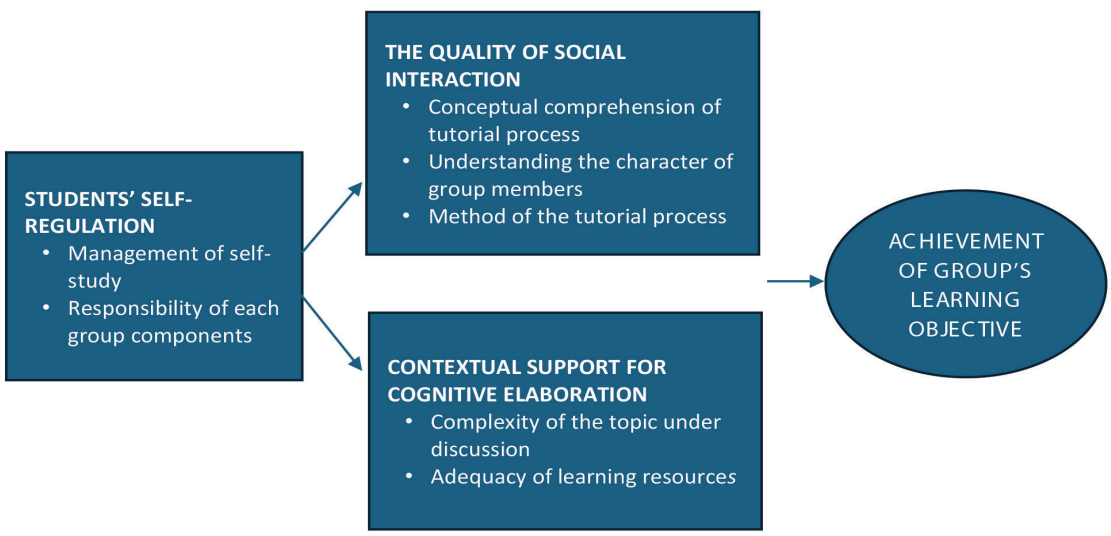


Figure 1: Factors affecting group effectiveness.

The Quality of Social Interaction

Conceptual comprehension of the tutorial process

According to the respondents, understanding the essence of a tutorial affects student seriousness within the discussion. The students argued that tutorials should enhance communication skills and foster a deeper understanding of a topic or material. The essence of the material serves as the foundation for study in the undergraduate medicine programme, while the material presented in general lectures provides additional knowledge.

> The thing is, most of what we learn in medicine is based on tutorials, while classes with experts are just supplementary. (GA2018, 464–468)

According to the respondents, student understanding of the tutorial mechanism affects discussion dynamics. Frequent tutorial implementation enables group members to gain numerous tutorial experiences that enhance their understanding of tutorial flow, including what to do and how to create effective group dynamics during discussions, ensuring smooth implementation from start to finish.

> The more years we are in, my classmates and tutorial friends understand better; they are aware of how tutorials flow and how to create good dynamics for tutorials. So, because it is already the final year as well, I am already more familiar with the others, so it is not awkward during tutorials. (GA2018, 215–221)

The study's results also show that students' understanding of the criteria for productive tutorials affects discussion dynamics. The respondents stated that a group is categorised as productive when the discussion is actively engaged and each member has a good understanding of the topic, as indicated by high quiz scores after the tutorial.

> Tutorials are considered productive if, for instance, the tutorial group members are engaged, resulting in an active and engaging discussion. That could be what tutorial effectiveness is. In the case of academic effectiveness, for example, it is when the scores are good. (AF2018, 363–367; 367–369)

The respondents also argued that achieving all learning objectives in a tutorial meeting can serve as an indicator of the tutorial's success. If all the group's learning objectives for a tutorial are achieved, then the tutorial implementation can be considered successful.

Understanding the character of group members

According to the respondents, camaraderie among tutorial group members can improve performance during tutorials. Camaraderie fosters a sense of comfort during discussions, thereby encouraging individuals to be more courageous in expressing their opinions. In addition, when there are good relationships among members, they can understand each other's characters and complement each other's weaknesses in tutorial groups.

> Tutorials are more like study groups, aren't they? For instance, if we are in a group but not close, I will personally find it difficult to express my opinions. However, if our bonding is already good, then we can understand the characters of each, and if there is a lack of explanation, we can complement each other. (TR2018, 96–105)

According to the respondents, group members should have self-awareness when expressing their opinions. Individuals with self-awareness demonstrate a sense of tolerance when expressing their ideas. They also recognise that they are not the only ones with opinions, acknowledging that others should be given equal opportunity to express their views.

> It is like we know our respective parts. We emphasise that it is not just you who can speak; your friends have not had the chance to speak yet. If, for example, a friend has not said anything yet, please let them speak first. If you want to add something afterward, you can do so then. I mean, you should not take your friend's part. (AK2020, 58–66)

The respondents also argued that unpleasant attitudes towards differences in opinions among group members can affect performance during tutorials. An unfavourable attitude during a disagreement can make other members feel reluctant to express their opinions.

Method of the tutorial process

The respondents argued that tutorial methods can also affect discussion dynamics. In the opinion of the respondents, each tutorial method has advantages. The offline tutorial method has a greater impact on discussion dynamics, as it is more systematic and information exchange is faster due to direct interaction. Meanwhile, online tutorials involve less direct interaction but make it easier for members to share material through group chats.

> I think offline (tutorials) are more systematic... we will determine the difficult words first and then the order of the questions. When offline, we are reminded immediately of the correct order. It is the same with online tutorials, but the interaction is faster offline. (AO2018, 164–175)

Contextual Support for Cognitive Elaboration

Complexity of the topic under discussion

According to the respondents, the difficulty level of tutorial material affects effectiveness in achieving learning objectives during a discussion. If the tutorial material is difficult, the discussion becomes unsystematic. On some occasions, the group members' answers or opinions do not align with the learning objectives being discussed, resulting in suboptimal achievement of those objectives.

> If, say, it is a long-winded explanation, and the LO (learning objective) is quite hard, it will also have an effect. That is what I felt in the second year when I was in the immunology block into course; it was complex. Sometimes there was a mismatch between the LO and what was conveyed, so it affected my understanding of the answers to the LO. (AF2018, 423–435)

Respondents argued that their difficulty in understanding the material was partly due to their limited English proficiency. The use of English references can reduce self-confidence when expressing opinions because it takes longer to understand the material in English than when the references are in bahasa Indonesia.

> Sometimes, when I use an English book, I also have difficulty understanding what the book (author) means. Now that I have taken extra lessons, it becomes easier because the concepts are explained beforehand. As a result, when the tutorial starts, I am more prepared. Once I was sure of what I was talking about, but it turned out that it was not what it meant. I was wrong. (RG2019, 328–341)

Adequacy of learning resources

According to the respondents, the facilities provided by the faculty affect the discussion process. Inadequate campus facilities can disrupt discussion, especially in the main tutorial facilities, which are meant to support the expression of opinions. This disruption occurs because the respondents need to find replacement facilities.

> Maybe in the first and second years, when we had to change rooms, the HDMI or RGB cables could not connect to the laptop, so I had to go downstairs again to the internal affairs division or general division to ask for a substitute cable and then went back upstairs. Well, that disturbed the discussion process. (GA2018, 512–517)

According to the respondents, group effectiveness is increased by the availability of a variety of information from different sources, reducing the likelihood of duplicate information. The more references used, the more information obtained.

> In my opinion, being productive is when members add material not only from the same sources because the answers become similar, like it is just repeated. However, when information is evenly distributed and comes from various sources, there is more to receive. (IK2018, 280–286)

Students' Self-Regulation

Management of self-study

According to the respondents, schedule arrangements for self-study affect the discussion process. Tutorials with two meetings are considered less effective than those with three. This relates to the time available to search for information sources during self-study, potentially leading to the presentation of incomplete material. The respondents stated that tutorial schedule arrangements with a tight interval between days can result in less optimal material preparation.

> The schedule has a bit of an effect because there are tutorials in a row, like on Tuesday, Wednesday and Thursday, and then there are classes until the afternoon on one of those days, so maybe on the next tutorial day, my friends cannot perform well because the time to search for material is limited and their understanding is also not optimal. (IM2018, 404–413)

The respondents also stated that individual time management skills are influenced by an external factor, namely, non-academic activities. They explained that non-academic activities, especially organisational activities, affect performance during tutorials. Organisational activities with a tight schedule can cause fatigue, reducing tutorial preparation and making students less enthusiastic during tutorials.

> For me, it is the thing related to a student organisation; I am often really busy with it. I was once in a state of feeling so tired that I cried because I felt like this was all too hard. During the tutorial, I did not realise I was showing a gloomy face and became quiet, which is unlike me, as I am usually expressive. My opinions became worse as well. (RA2018, 299–310)

An individual's ability to implement effective learning strategies also affects their performance, which can ultimately influence group discussion dynamics and, in turn, group effectiveness. The respondents believed that the use of appropriate learning media can improve understanding during self-study. Learning media often takes the form of learning videos on social media platforms.

Responsibility of each group component

According to the respondents, each member's role in a tutorial affects group effectiveness. Each member should fulfil their role to ensure the discussion process runs well and all group objectives are achieved. One of the roles among tutorial members is that of chairperson. A chairperson should be able to lead the discussion and give directions.

> So, for example, the chairman controls the flow of the tutorial and leads the tutorial and then... what is it... for example, if my friend shows me material that differs from what another friend has, that is when the chairman comes to mediate. (VL2019, 177–187)

Another role within the PBL tutorial group is the group scribe. One respondent stated that a scribe should systematically record all the ideas shared during the discussion in a note. This note guides other members on the topic under discussion and helps them identify their knowledge gaps.

> Then, for scribes... some scribes do not take notes on all the material delivered, so a scribe must have a high level of concentration and take notes on all the main points that have been conveyed. This is to ensure that in the next meeting we are aware of what is being discussed and that there is no need to repeat the explanation. Moreover, a scribe should not only take notes but also provide opinions. (IK2018, 259–268)

DISCUSSION

The results of the study indicate that the effectiveness of tutorial groups is influenced by three key factors: (a) the quality of social interaction; (b) contextual support for cognitive elaboration; and (c) student self-regulation. The quality of social interaction encompasses understanding PBL tutorials, group member characteristics and the tutorial method and process. Student understanding of PBL tutorials is an important factor determining group effectiveness. The results of this study also show that this understanding includes the essence of tutorials and the mechanisms of productive tutorials. Understanding the benefits and methods of discussion is crucial, as it will encourage students to participate more actively in the discussion process. Students will also engage in discussions according to the rules and have good social interaction, resulting in improved collaboration processes and knowledge construction. In PBL tutorials, this will eventually impact the achievement of learning objectives. One previous study found that students with a good understanding of PBL tutorials tended to have higher self-efficacy and motivation during tutorials, leading to increased participation in the discussion process (23).

The results of the study also indicate the importance of understanding the characteristics of other group members to improve discussion quality and achieve learning objectives. Understanding the characteristics of other group members can enhance social interaction and group cohesion. Previous research has shown that camaraderie among tutorial group members improves performance because it fosters a sense of comfort and the courage to express opinions. A previous study demonstrated that group cohesion can enhance the quality of collaboration in PBL tutorials, ultimately influencing the optimal achievement of learning objectives. On the other hand, a lack of group cohesion can hinder participation (24). The results of this study also show that each group member's personal characteristics can affect discussion dynamics. Cooperative individuals tend to accept others readily. In contrast, a rigid, inflexible attitude towards differences of opinion can hinder participation, as individuals in such an environment tend to be reluctant to express their opinions due to fear of conflict or a desire to avoid personal harm (17).

Another aspect related to the quality of social interaction is the method of tutorial implementation. In particular, whether a tutorial is face-to-face or online can affect group effectiveness. The respondents in this study argued that each method has its advantages and disadvantages. In face-to-face discussions, students feel more at ease. Previous studies have also shown that each method has its strengths and weaknesses. For example, it has been

shown that the achievement of learning objectives in face-to-face tutorials is not significantly different from that in online tutorials (25). However, other studies indicate that students demonstrate better abilities in active participation, communication, and critical thinking when face-to-face (26).

The second factor relating to the effectiveness of tutorial groups identified in this study is contextual support for cognitive elaboration, comprising the complexity of tutorial materials and the adequacy of learning resources. The complexity of the material discussed is a factor affecting cognitive elaboration during tutorials, which in turn affects group effectiveness. The results of this study indicate that complex material can reduce group effectiveness, as the resulting discussion tends to be unsystematic and not all learning objectives can be thoroughly addressed. Complex topics or cases require good critical thinking skills (higher-order thinking) from discussion members. Complex discussion topics can also trigger variations in opinions among group members, making the discussion lengthy and unstructured. This condition reflects unsystematic cognitive elaboration among group members. Previous research has shown that implementing a discussion process using structured cases or familiar topics improves the quality of discussion (27).

The results also indicate that the process of cognitive elaboration is influenced by the adequacy of learning resources. The quality of infrastructure and facilities for discussions greatly supports the smoothness of the discussion process. A discussion process disrupted by technical issues can result in non-optimal collaboration and knowledge construction processes in tutorial discussions. This condition can ultimately reduce students' learning motivation (28). Previous research has shown that the availability of equipment that supports the interaction process in discussions, such as smartboards, applications for organising opinions, and other infrastructure, can increase student engagement in discussions because it allows for real-time collaboration and feedback (29). The diversity of references used by students in a tutorial process also affects the effectiveness of tutorial groups. References that provide in-depth explanations of theories and concepts, such as textbooks, tend to enhance learning motivation, whereas those that offer only superficial information tend to decrease it (28).

The third factor related to group effectiveness is student self-regulation, including how the students manage their self-study and take responsibility for their role in PBL tutorials. The quality of self-study affects students' performance in tutorials, which, in turn, impacts the effectiveness of tutorial groups. The results of this study suggest that allocating sufficient self-study time will enable students to access more comprehensive and reliable learning resources. The implementation of appropriate learning strategies helps students understand the material, which then becomes the predetermined learning objectives set during tutorial discussions and brainstorming sessions. Previous research has shown that the duration of self-study time is a determining factor in students' choice of learning strategies, which in turn affects student performance during tutorial discussions (30).

The results further indicate that students' capability to regulate learning during PBL tutorials affects group effectiveness. Each component in tutorials (tutor, chairman, scribe and members) is expected to perform their respective roles to achieve the learning objectives. In PBL tutorials, each component plays a crucial role in supporting group effectiveness. Good organisation and active participation from all members of tutorial groups, including the chairman, scribe and members, will make the discussion process more effective, resulting in optimal achievement of the learning objectives (13). On the other hand, group effectiveness can be disrupted if these roles are not fulfilled. Tutors who do not facilitate discussion can hinder understanding; a chairperson who is unable to lead discussion can make it unfocused;

and a scribe who does not take accurate notes can create confusion. Meanwhile, passive members can hinder the exploration of ideas and in-depth understanding.

The results of this study indicate that these three factors (the quality of social interaction, contextual support for cognitive elaboration intensity, and student self-regulation) are interrelated in their effects on the effectiveness of PBL tutorials (Figure 1). From the perspective of the three primary components of a group—input, process and output—student self-regulation constitutes the input, serving as the essential element that directs students in effectively managing themselves to excel in group discussions and optimally construct their knowledge (8). The quality of social interaction significantly affects the degree of cognitive elaboration during the learning process. When social interaction within the group is obstructed, information exchange becomes inefficient, constraining the development of knowledge among members; consequently, the group may not entirely fulfil its designated learning objectives. In contrast, when social interaction is robust and affirmative, students can more successfully elaborate on ideas and cooperatively enhance their comprehension. This condition finally enables the successful achievement of the group's learning objectives (3). In summary, aligning and integrating these diverse factors will enhance group effectiveness, ultimately leading to the attainment of the anticipated learning objectives.

This study enriches the literature by showing that the effectiveness of PBL tutorials is influenced not only by student-related factors but also by other factors (31,32). These other factors include the quality of social interaction and contextual support for cognitive elaboration. This study also reveals that student self-regulation affects the effectiveness of a tutorial. Interestingly, the study found that an activity performed outside the discussion process—namely, student self-study—also affects tutorial effectiveness. These various factors are interrelated in their impact on group effectiveness.

The implications of this research for educators or institutions are: (a) to prepare students regarding their understanding of the essence of PBL and tutorial processes through PBL philosophy and the selection of appropriate learning strategies for self-study; (b) to design problems and learning objectives for discussion based on students' prior knowledge to ensure the discussion process runs smoothly; (c) to provide sufficient and good-quality learning resources that directly or indirectly improve the quality of the tutorial discussion process; and (d) to pay attention to the phase of student group dynamics when changing tutorial groups (the dynamics of the tutorial discussion will not be optimal if tutorial groups are changed when students are still in the introduction phase).

Limitations and Recommendations for Future Research

The study was conducted at a single institution, so the results may not generalise to other populations or contexts. In addition, the respondents in this study were all students, which limited the perspectives explored to a single point of view based solely on student experience. Further research involving tutors and combining their input with direct observations of the discussion process is recommended.

CONCLUSION

Students' capacity to regulate their learning—including their self-study management and sense of responsibility as group members—plays an important role in shaping the quality of social interaction during tutorial discussions. This social interaction, which relies on

understanding of the tutorial process, awareness of other members' characteristics and the selected tutorial method, will influence the intensity of cognitive elaboration. The cognitive elaboration process is also influenced by factors such as the complexity of the topic and the adequacy of the learning resources. Altogether, student self-regulation, the meaningfulness of social interaction and the context of cognitive elaboration collectively contribute to the extent to which students achieve the intended learning objectives.

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ETHICAL APPROVAL

This research has received approval from the Ethics Committee of the FM UII (Ref no. 18/Ka.Kom.Et/70/KE/III/2018). The research participants received an explanation prior to the commencement of the research and signed a written informed consent form. The data were analysed anonymously, stored, and protected using a password known only to the researcher.

REFERENCES

1. Trullàs JC, Blay C, Sarri E, Pujol R. Effectiveness of problem-based learning methodology in undergraduate medical education: a scoping review. BMC Med Educ. 2022;22(1):1–12. https://doi.org/10.1186/s12909-022-03154-8

2. Kaufman DM, Mann KV. Achievement of students in a conventional and problem-based learning (PBL) curriculum. Adv Health Sci Educ Theory Pract. 1999;4:245–60. https://doi.org/10.1023/A:1009829831978

3. Palincsar AS. Social constructivist perspectives on teaching and learning. Annu Rev Psychol. 1998;49:345–75. https://doi.org/10.1146/annurev.psych.49.1.345

4. Saleem A, Kausar H, Deeba F. Social constructivism: a new paradigm in teaching and learning environment. Perenn J Hist. 2021;2(2):403–21. https://doi.org/10.52700/pjh.v2i2.86

5. Dolmans D, Schmidt H. The problem-based learning process. In: van Berkel H, Scherpbier A, Hillen H, van der Vleuten C, editors. Lessons from problem-based learning. Oxford: Oxford University Press; 2010. p. 13–20. https://doi.org/10.1093/acprof:oso/9780199583447.003.0003

6. Kassab SE, Hamdy H, Mamede S, Schmidt H. Influence of tutor interventions and group process on medical students' engagement in problem-based learning. Med Educ. 2024;58(11):1315–23. https://doi.org/10.1111/medu.15387

7. Iqbal M, Velan GM, O'Sullivan AJ, Balasooriya C. Differential impact of student behaviours on group interaction and collaborative learning: medical students' and tutors' perspectives. BMC Med Educ. 2016;16:1–11. https://doi.org/10.1186/s12909-016-0730-1

8. Kozlowski SWJ, Ilgen DR. Enhancing the effectiveness of work groups and teams. Psychol Sci Public Interes. 2006;7(3):77–124. https://doi.org/10.1111/j.1529-1006.2006.00030.x

9. Li A, Bilgic E, Keuhl A, Sibbald M. Does your group matter? How group function impacts educational outcomes in problem-based learning: a scoping review. BMC Med Educ. 2022;22:1–34. https://doi.org/10.1186/s12909-022-03966-8

10. Dolmans DHJM, Wolfhagen IHAP. Complex interactions between tutor performance, tutorial group productivity and the effectiveness of PBL units as perceived by students. Adv Health Sci Educ Theory Pract. 2005;10:253–61. https://doi.org/10.1007/s10459-005-0665-5

11. Singaram VS, van der Vleuten CPM, van Berkel H, Dolmans DHJM. Reliability and validity of a tutorial group effectiveness instrument. Med Teach. 2010;32(3)133–7. https://doi.org/10.1007/s10459-010-9262-3

12. Shankar PR, Nandy A, Balasubramanium R, Chakravarty S. Small group effectiveness in a Caribbean medical school's problem-based learning sessions. J Educ Eval Health Prof. 2014;11:1–6. https://doi.org/10.3352/jeehp.2014.11.5

13. Nayak BS, Sridevi V, Sahu P, Subbaramaiah N, Telang L, Goudappala P, et al. Students' engagement and perceptions of small group tutorial classes among undergraduate medical students. J Adv Med Educ Prof. 2021;9(1):18–25. https://doi.org/10.30476/jamp.2020.86 925.1280

14. Carlo MD, Swadi H, Mpofu D. Medical student perceptions of factors affecting productivity of problem-based learning tutorial groups: does culture influence the outcome? Teach Learn Med. 2003;15(1):59–64. https://doi.org/10.1207/S15328015TLM1501_11

15. Li A, Mellon M, Keuhl A, Sibbald M. Measuring group function in problem-based learning: development of a reflection too. BMC Med Educ. 2023;23(1):1–745. https://doi.org/10.1186 /s12909-023-04726-y

16. Azer SA, Azer D. Group interaction in problem-based learning tutorials: a systematic review. Eur J Dent Educ. 2014;19(4):194–208. https://doi.org/10.1111/eje.12121

17. Jang HW, Park SW. Effects of personality traits on collaborative performance in problem-based learning tutorials. Saudi Med J. 2016;37(12):1365–71. https://doi.org/10.15537/smj.2016.12. 15708

18. Barrett T. Learning about the problem in problem-based learning (PBL) by listening to students' talk in tutorials: a critical discourse analysis study. J Furth High Educ. 2013;37(4):519–35. https://doi.org/10.1080/0309877X.2011.645464

19. Schmidt HG, Rotgans JI, Yew EHJ. The process of problem-based learning: what works and why. Med Educ. 2011;45(8):792–806. https://doi.org/10.1111/j.1365-2923.2011.04035.x

20. Alhazmi AA, Kaufmann A. Phenomenological qualitative methods applied to the analysis of cross-cultural experience in novel educational social contexts. Front Psychol. 2022;13:1–12. https://doi.org/10.3389/fpsyg.2022.785134

21. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77–101. https://doi.org/10.1191/1478088706qp063oa

22. Lincoln YS, Guba EG. Naturalistic inquiry . Beverly Hills(CA): SAGE Publications; 1985.

23. Lin-Aung H, Masumoto D, Linn Z, Kobayakawa Y, Okamura S, Kurihara K, et al. Students' perception of problem-based learning at a Japanese medical school: an exploratory sequential mixed method. Int J Med Educ. 2022;13:322–34 https://doi.org/10.5116/ijme.6399.dee1

24. Hendry G, Wiggins S, Anderson T. The discursive construction of group cohesion in problem-based learning tutorials. Psychol Learn Teach. 2016;15(2):180–94. https://doi.org/10.1177/1475725716643267

25. Atwa HS, Nasr El-Din WA, Kumar AP, Potu BK, Tayem YI, Al-Ansari AM, et al. Online or face-to-face problem-based learning tutorials? Comparing perceptions and preferences of students and tutors. Front Educ. 2024;9:1–13. https://doi.org/10.3389/feduc.2024.1354494

26. Foo CC, Cheung B, Chu KM. A comparative study regarding distance learning and the conventional face-to-face approach conducted problem-based learning tutorial during the COVID-19 pandemic. BMC Med Educ. 2021;21:1–6. https://doi.org/10.1186/s12909-021-02575-1

27. Rotgans JI, Schmidt HG. The role of teachers in facilitating situational interest in an active-learning classroom. Teach Teach Educ. 2011;27(1):37–42. https://doi.org/10.1016/j.tate. 2010.06.025

28. Nuraisah I, Sulistiyana CS, Primanagara R. 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. Int J Soc Heal. 2024;3(11):256–72. https://doi.org/10.58860/ijsh.v3i11.253

29. Razzak RA, Hasan Z, Stephen A. Medical student perceptions of integration of a customized cloud based learning operating system into problem based learning tutorials. Electron J E-Learn. 2020;18(1):25–36. https://doi.org/10.34190/EJEL.20.18.1.003

30. Wijnen M, Loyens SMM, Smeets G, Kroeze M, van der Molen H. Comparing problem-based learning students to students in a lecture-based curriculum: learning strategies and the relation with self-study time. Eur J Psychol Educ. 2017;32(3):431–47. https://doi.org/10.1007/s10212-016-0296-7

31. Dolmans DHJM, Schmidt HG. What do we know about cognitive and motivational effects of small group tutorials in problem-based learning? Adv Health Sci Educ Theory Pract. 2006;11(4):321–36. https://doi.org/10.1007/s10459-006-9012-8

32. Singaram VS, van der Vleuten CPM, Stevens F, Dolmans DHJM. "For most of us Africans, we don't just speak": a qualitative investigation into collaborative heterogeneous PBL group learning. Adv Health Sci Educ Theory Pract. 2011;16(3):297–310. https://doi.org/10.1007/s10459-010-9262-3