Project-Based Learning: A Nexus for Mental Health Competency in Medical Education

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Abstract

This study evaluated the impact of project-based learning (PBL) on medical students' skills and preparedness for mental health outreach at the University of Guyana, particularly amid COVID-19 disruptions. A qualitative phenomenological design using thematic analysis explored students' perceptions of traditional lectures versus PBL. Ten volunteer students participated in pre- and post-intervention interviews to assess changes in their views on curriculum effectiveness, practical experience, and personal development.

Findings from pre-intervention discussions highlighted concerns about limited hands-on experience, while post-intervention themes emphasized collaborative learning, improved understanding of mental health, and enhanced communication skills. Despite challenges adapting to resource limitations and mixed method learning, students reported increased engagement and skill acquisition.

The study concludes that PBL is an effective strategy for mental health education, reinforcing the need for curriculum adaptations to enhance practical skills and collaborative learning, ultimately improving health sciences education in evolving academic environments.

Keywords: *Project-Based Learning, Medical education, Mental health advocacy, First-year students, Problem-based learning, Student engagement, Community outreach, Curriculum development*

1. Introduction

Medical education is traditionally founded on the practical application, where students perfect their skillsets in real-life situations. Students must be able to practice, make mistakes, and learn in pre-clinical environments before they can advance to clinical practice. Unfortunately, the COVID-19 pandemic disrupted this fundamental element, resulting into a switch into what has been termed emergency remote teaching. A substantial number of students, especially in Europe, reported greater learning loss, including lower concentration levels and higher psychological stress. Evidence suggests technical and soft skills are best developed in a face-to-face instructional environment, which still remains impossible for many institutions during the pandemic.

At the University of Guyana, students pursuing health sciences encountered difficulties when classes shifted to an online format. Although virtual classes ensured that learning would not be totally disrupted, they lacked the practical components that are vital for their training. This gap necessitated the exploration of how project-based learning (PBL) could enhance students' competencies in mental health outreach programs. A mixed-methods quasi-experimental study was conducted to assess the impact of project-based learning on students' skills regarding mental health outreach programs at the University of Guyana. Instead of prescribing a specific learning approach, the study investigates how PBL affected students' experiences and perceptions of their professional growth in mental health education. The integration of project-based learning (PBL) into medical

education has emerged as a transformative strategy for enhancing mental health competency, bridging gaps in traditional curricula, and fostering essential skills such as communication, empathy, and clinical reasoning. This review synthesizes evidence from diverse studies to demonstrate PBL's efficacy in medical training, particularly in mental health education.

1.1. PBL Enhances Learning Performance and Mental Health Competency

Zang et al. (2022) found that PBL significantly improves learning performance, particularly when mediated by mental health awareness and innovative technologies like semi-immersive virtual reality. Their study, conducted with Chinese high school students, revealed that PBL not only strengthens academic outcomes but also enhances psychological well-being—a finding with direct implications for medical education, where mental health literacy is critical. Similarly, Lee et al. (2024) demonstrated that collaborative PBL in nursing education significantly boosted global health competency ($p < 0.001$), communication skills ($p = 0.015$), and problem-solving abilities ($p = 0.002$), reinforcing its applicability in medical training.

1.2. Addressing Gaps in Mental Health Training Through PBL

Marahatta et al. (2021) highlighted severe disparities in mental health education across Nepalese medical schools, where curricula often lack sufficient clinical exposure and active learning methods. Their findings underscore the need for PBL as a scaffold for mental health training, particularly in low-resource settings where specialist shortages exist. This aligns with Domínguez-Amorocho et al. (2021), who argued that PBL promotes critical thinking and interdisciplinary collaboration, essential for mental health advocacy.

1.3. PBL Fosters Empathy and Emotional Competencies

Kim (2020) demonstrated that PBL-based empathy training significantly improved empathic communication in medical students, particularly among those with initially lower empathy scores ($p < 0.01$). This suggests that structured, experiential projects can cultivate emotional intelligence—a cornerstone of mental health care. Sviatko (2024) further supported this, showing that community-service PBL enhanced Gen Z students' self-regulation, motivation, and leadership skills, all vital for patient-centered mental health practice.

1.4.Innovative PBL Approaches in Medical Education

Elkhamisy & Sharif (2022) introduced meme-based PBL in pathology courses, finding that 93.3% of students rated the method as highly beneficial for creativity and motivation. Abdelsalam et al. (2022) also reported that interdisciplinary PBL improved clinical reasoning ($p = 0.000$) and integration of basic/clinical sciences, with 84.6% of students endorsing its use over traditional lectures. These studies illustrate PBL's adaptability across medical disciplines, including mental health education.

1.5.Challenges and Future Directions

Despite its benefits, PBL implementation faces barriers, such as resource intensity and faculty training needs (Trullàs et al., 2022). However, Trullàs et al. (2022) concluded that PBL's advantages—enhanced communication, problem-solving, and knowledge retention—outweigh these challenges, advocating for its broader adoption in medical curricula.

The evidence overwhelmingly supports PBL as a nexus for mental health competency in medical education, offering a dynamic, student-centered approach that bridges theoretical knowledge with real-world application. By integrating PBL, institutions can cultivate empathetic, skilled practitioners capable of addressing the growing global mental health burden. Future research should explore long-term competency retention and scalable PBL models for diverse educational settings.

2. Methods

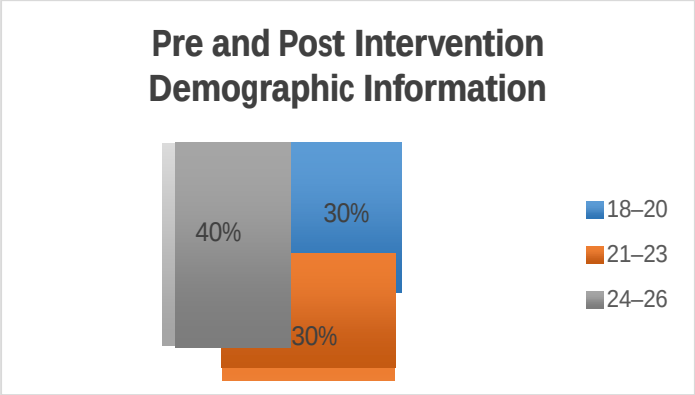
This study employed a qualitative phenomenological design grounded in constructivism, utilizing thematic analysis to achieve data saturation. It explored students' perceptions of traditional lecture-based learning versus project-based learning (PBL) and evaluated the impact of project-based learning strategies on student development in mental health outreach programs. It facilitated interative cycles of observation, reflection, and refinement to explore students' lived experiences and perceptions (Creswell & Creswell, 2018). The researcher conducted pre- and post-intervention interviews with 10 volunteer students to capture their perceptions of traditional lecture-based approaches in preparing for mental health outreach activities vs project-based intervention. These interviews aimed to assess changes in students' perceptions regarding the effectiveness of traditional lecture-based methods compared to the interactive approaches used in the outreach programs. The evaluation focused on how problem-based strategies and logic models impacted their preparedness and engagement in mental health outreach activities (Kemmis, McTaggart, & Nixon, 2014).

3. Results

3.1.Pre and Post Intervention Demographic Information

The pre-intervention group consisted of 60% male and 40% female participants. Age distribution saw a balanced representation with 30% falling in the 18-20 category, 30% in the 21-23 category, and 40% in the 24-26 category. The same students volunteered for both pre- and post-intervention interviews, maintaining a consistent demographic profile with a gender ratio of 60% male and 40% female, and age distribution of 30%, 21%, and 40% for each age category respectively.

Figure 1: Pre and Post Intervention Demographic Information



3.2.Summary of Pre-intervention Thematic Analysis Table

Table 1A &B summarizes the major themes and sub-themes derived from pre-intervention interviews conducted with medical students regarding their experiences and perceptions of the curriculum related to mental health outreach programs. Each central theme is accompanied by relevant sub-themes that provide a more detailed understanding of the concepts discussed by the participants. The frequency column indicates the number of times specific themes and sub-themes were mentioned during the interviews, offering insight into students' predominant areas of concern or focus.

For instance, "Curriculum Effectiveness" emerged as a critical theme, highlighting students' perceptions of their preparedness for mental health outreach and the adequacy of the curriculum content, with a frequency score of 10. Other significant themes include "Practical Experience," which emphasized the need for hands-on activities and the value of real-world application, also scored at 10.

This table effectively highlights the primary concerns and insights from students before the implementation of Project-Based Learning. It provides a foundation for understanding the strengths and weaknesses of the current curriculum and informing subsequent improvements. Such insights are crucial for enhancing educational practices and adapting the curriculum to better meet student needs in mental health education.

Table 1A: Pre- Intervention thematic analysis

Major Themes	Sub-Themes	Frequency
Curriculum Effectiveness	Preparedness for mental health outreach, Adequacy of curriculum content	10
Practical Experience	Need for hands-on activities, Value of real-world application	10
Challenges and Limitations	Insufficient data specific to Guyana, Limited resources, Lack of participant engagement	9
Communication Skills Development	Improvement through curriculum, the Necessity for effective communication in medical practice	9
Faculty Interaction and Feedback	Responsiveness of faculty, Mechanisms for feedback, Student engagement with faculty	6
Cultural Perspectives on Mental Health	Cultural barriers, Stigma associated with mental health, Public and personal perceptions	5

Table 1B: Pre-intervention thematic analysis (continued)

Major Themes	Sub-Themes	Frequency
Teamwork and Collaboration	Benefits of group work, Challenges in collaboration, Enhancing team dynamics	7
Integration and Application of Mental Health Topics	Integration in curriculum, Practical relevance, Coverage and depth of topics	4
Student Engagement and Participation	Levels of involvement, Motivation among students, Impact of student engagement on learning	4

Accessibility and Outreach	Reaching broader communities, Venue and timing concerns, Outreach impact and necessity	3

3.3.Summary of Post-intervention Thematic Analysis Table

Tables 2A and B summarize the major themes and sub-themes identified from post-intervention interviews with medical students regarding their experiences after participating in Project-Based Learning (PBL) activities in mental health outreach programs. Each central theme is accompanied by specific sub-themes that provide deeper insights into the participants' reflections on their learning outcomes. For example, the "Collaborative Learning" theme captures the significance of teamwork and group dynamics, highlighted by a frequency of 7, and peer-to-peer support, indicated by a frequency of 5. This suggests that students valued the collaborative aspects of their learning experience. Another prominent theme is the **"Impact on Personal Development,"** where students reported a significant increase in their understanding of mental health (frequency of 9) and marked improvements in their communication skills (frequency of 7). Table 2A also shows **"Challenges and Adaptations,"** indicating that students faced issues related to space and resource limitations (frequency of 6) and had to adjust to the conditions following the COVID-19 pandemic (frequency of 4).

Furthermore, the theme of **"Practical Experience"** emphasized the value of hands-on activities (frequency of 8) and interactions with the community through real-life scenarios (frequency of 6). Lastly, themes related to the **"Effectiveness of Outreach Methods"** and **"Feedback and Learning Improvement"** were discussed, showcasing the utilization of digital media for broader outreach (frequency of 5) and the importance of face-to-face interactions (frequency of 4). Feedback mechanisms and self-reflection were also noted, emphasizing the role of constructive feedback from instructors and peers (frequency of 7) alongside self-assessment (frequency of 3). Overall, this table illustrates the multifaceted impact of the PBL approach on students' learning experiences, highlighting the benefits and challenges they encountered throughout the mental health outreach initiative.

Table 2A: Post- Intervention thematic analysis

Main Themes	Sub Themes	Frequency
Collaborative Learning	Teamwork and group dynamics	7
	Peer-to-peer learning and support	5
Challenges and Adaptations	Adapting to space and resource limitations	6
	Adjusting to post-COVID conditions	4
Impact on Personal Development	Increased understanding of mental health	9
	Improvement in communication skills	7

Table 2B: Post-intervention thematic analysis (continued)

Main Themes	Sub Themes	Frequency
Practical Experience	Value of hands-on activities	8
	Interaction with community and real-life scenarios	6
Effectiveness of Outreach Methods	Use of digital media for wider reach	5
	Importance of face-to-face interaction	4
Feedback and Learning Improvement	Role of feedback from instructors and peers	7
	Self-assessment and reflection on learning	3

3.4.Pre-Intervention Themes

The pre-intervention interviews yielded several key themes reflecting medical students' perceptions of the traditional curriculum related to mental health outreach programs.

1. Curriculum Effectiveness

This theme emerged prominently with a frequency of 10, as many participants recognized the structured nature of the curriculum in preparing them for real-world applications. One student stated, “I think the programme was well thought out and fruitful” (I2), indicating their appreciation for the existing program structure. Another added, “The content that you have taught us so far...allowed me to understand the seriousness of what we're doing here” (I5), underscoring their awareness of the importance of mental health education. These insights indicate a foundational appreciation but also hint at potential gaps in practical application that need addressing.

2. Practical Experience

The theme of practical experience was noted with a frequency of 10, highlighting students’ desire for hands-on engagement. One expressed, “I feel like I would have to actually carry out it this Friday to actually get the experience” (I3), suggesting a limited avenue for experiential learning. Additionally, statements such as, “I'm somewhat prepared, and I'm hoping eventually I'll be more prepared for next week” (I6) indicate a mix of readiness and uncertainty among students, revealing gaps in their practical training that the traditional approach failed to fill effectively.

3. Challenges and Limitations

Participants identified several challenges and limitations, reflected in a frequency of 9. Many students pointed to a lack of relevant data specific to the local context, with one stating, “I think there’s a lack of data...pertaining to Guyana” (I9). This acknowledgment reveals a significant barrier to effectively applying learned concepts in a local context and the need for course materials tailored to address area-specific health issues.

4. Communication Skills Development

This theme emerged with a frequency of 9, showcasing students' aspirations to enhance their communication skills in professional settings. One participant articulated, “I always wanted to sharpen my public speaking skills” (I2), signaling that students understood effective communication as critical for their future roles. However, the emphasis on needing practical experience to apply these skills effectively— “I think it has helped me well...but I like to have practical experience to better base my answers” (I5)—highlights a gap in the existing curriculum.

5. Faculty Interaction and Feedback

Identified with a frequency of 6, this theme reflected mixed perceptions regarding faculty engagement. Positive remarks included, “You’ve been excellent because any concerns I had during this curriculum, you’ve addressed it on time” (I6). However, other students felt disconnected, stating, “I don't think I am involved with anything relating to this...having feedback” (I8). This

inconsistency in faculty interaction signals a need for improvement in communication and feedback mechanisms.

These findings align with global challenges identified in the literature. Marahatta et al. (2021) found that medical schools in Nepal allocated only 25-92 hours to mental health training, often relying on passive methods. Domínguez-Amorocho et al. (2021) argued that such traditional approaches fail to cultivate critical thinking or interdisciplinary collaboration; skills essential for mental health advocacy.

3.5.Post-Intervention Themes

Post-intervention interviews revealed significant shifts in students' perceptions, underscoring the impact of the PBL approach.

1. Collaborative Learning

Emerging as a central theme with a frequency of 7, students highlighted the importance of teamwork. One participant stated, “If it wasn't for the cooperation… I don't think we would have effectively carried out the activities” (I9), emphasizing how collaborative efforts were essential for successful outreach activities. Another remarked, “This was actually one of the first interventions where we did something together” (I8), showing that PBL fostered a sense of community and engagement previously lacking in traditional methods. This mirrors Lee et al. (2024), where PBL boosted communication skills ($p = 0.015$) and problem-solving ($p = 0.002$) in nursing students.

2. Challenges and Adaptations

With a frequency of 6, this theme revealed that students faced challenges such as resource limitations. One noted, “The only challenge was finding the right audience for the areas we were focusing on” (I4), indicating difficulties in reaching the intended populations. Adjustments to the post-COVID context were also addressed, with students stating, “We had to adapt to both online and in-person learning environments, as we see a mix of learning environments” (I9), reflecting both the flexibility required and the ongoing challenges of adjusting to new norms. This theme parallels Elkhamisy and Sharif’s (2022) meme-based PBL, where 93.3% of students leveraged low-cost creativity to enhance engagement. Trullàs et al. (2022) confirmed that while PBL requires faculty training, its benefits in knowledge retention and skill-building justify the investment.

3. Impact on Personal Development

Students acknowledged a significant increase in personal growth, with this theme attaining a frequency of 9. One participant observed, “I think that post-COVID-19...we had to adapt to both online and in-person” (I9), indicating a transition period that promoted resilience. Another student remarked, “The communication skills...really improved” (I8), highlighting personal development in essential skills necessary for effective outreach. Kim’s (2020) empathy-training PBL similarly showed gains for students with initially low empathy ($p < 0.01$).

4. Practical Experience

With a frequency of 8, this theme illustrated the students' recognition of the value of experiential learning. A student noted, "The practical intervention part really allowed me to see how much more I still have to learn" (I10). This acknowledgment suggests that practical applications facilitated deeper learning and a commitment to ongoing education in mental health topics.

5. Effectiveness of Outreach Methods

This theme emerged with a frequency of 5, highlighting the diversity of outreach strategies. One said, "The webinars and podcasts helped a lot... Facebook helped us reach a broader audience" (I8), underscoring the effectiveness of digital tools in outreach efforts and indicating their limitations. This theme echoes Zang et al. (2022), who linked PBL with technology-mediated learning gains. Abdelsalam et al. (2022) further validated this, with 84.6% of medical students preferring PBL over lectures for clinical reasoning ($p = 0.000$).

4. Limitations

1. The sample size was relatively small, limiting the generalizability of the findings. Future research should involve a larger, more diverse participant group to validate these results.
2. The study was conducted within a single institution, restricting its applicability to other educational settings. Expanding the research to multiple institutions would provide broader insights into the effectiveness of experiential learning in medical education.
3. There was a short duration of the intervention, which may not fully capture the long-term impact of project-based learning on student advocacy skills. Longitudinal studies are recommended to assess sustained competency development. Furthermore, resource constraints affected the implementation of outreach activities.

Recommendations

1. Faculty training on effective project-based teaching methods should also be prioritized to improve mentorship and student engagement.
2. Fostering stronger partnerships with local health organizations can provide students with more immersive community-based learning experiences, further strengthening their advocacy skills.
3. Institutions should consider allocating more funding and infrastructural support to project-based learning initiatives to overcome resource constraints and expand outreach efforts.

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