

Original Research

Evaluating the Effectiveness of Peer-Assisted Learning at the School of Medicine, Ahfad University for Women: A Quasi-Experimental Pre- and Post-Test Study

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Background

Peer-Assisted Learning (PAL), where students teach and support each other, is common in health professions education and reflects the idea that learning happens best through social interaction. While PAL is informally practiced at Ahfad University for Women-School of Medicine, its effectiveness has never been formally studied. This presents an opportunity to better understand and improve how students learn from one another.

Methods

We conducted a quasi-experimental design using pre- and post-tests to evaluate the impact of peer-led instruction. Second-year medical students were split into two groups of 15—one received three one-hour teaching sessions from trained fourth-year student tutors, while the other served as a control. To measure academic improvement, we compared exam scores from before and after the teaching sessions using two modules from the Basic Medical Sciences course. This allowed us to assess whether peer teaching made a real difference in student performance.

Results

Both the intervention group and the control group showed improvement in post-intervention exam scores. Yet, these changes weren't statistically significant at all: the intervention group had a mean improvement of 9.4 points ($p = 0.091$), and the control group had a mean improvement of 6.7 points ($p = 0.076$). And when you look at the scores of the two groups, no significant difference can be found in pre-intervention scores ($p = 0.648$) or post-intervention scores ($p = 0.819$). Oh, and in case you're wondering, there wasn't a meaningfully negative association between tutor performance and tutee performance either—if there had been, we would have said there was a pretty strong negative association going on.

Conclusion

This study found that peer-assisted learning (PAL) didn't lead to better exam results for medical students. Tutors and learners showed little performance connection; this is likely due to gaps in tutor knowledge. Strengthening PAL may require better tutor training and formally integrating it into the curriculum. Future research should also explore how PAL shapes clinical skills and professional development, not just academic outcomes.

INTRODUCTION

Peer-assisted learning (PAL), also known as peer-to-peer learning (PPL), is defined by Topping as “people from similar social groupings who are not professional teachers, helping each other to learn and learning themselves by teaching.”^{1,2} PAL is a flexible learning method applied across a wide range of professions and educational levels.

It offers a unique social experience that involves active engagement and collaboration among learners, which aligns with the social constructivist theory of cognitive development.¹

There is strong evidence that peer tutoring is effective in improving academic performance and cognitive skills in primary and secondary education settings, while also being cost-effective.¹ PAL has also been widely adopted in higher education—including business, finance, management, and

health professions such as medicine, nursing, pharmacy, and dentistry—with particularly high uptake in nursing education.³⁻¹⁴ Studies suggest that PAL is especially valuable in resource-limited settings, though it is not without limitations.

Challenges associated with PAL include the possibility that student tutors may lack the necessary knowledge or skills to effectively support peers.^{15,16} Tutors may also struggle with group management or interpersonal dynamics, potentially hindering learning. Concerns have also been raised about the misuse of PAL tutors as a substitute for faculty due to staff shortages, effectively treating them as “cheap labour.”¹⁵ Additionally, preparing and training peer tutors can demand significant time and effort, potentially diverting attention from core teaching responsibilities.¹⁶

A major issue in the PAL literature is the lack of standardized terminology and consistent definitions, which may stem from the diversity of its applications.^{1,17}

In Sudan, a few notable studies have explored the use of PAL; however, further research and broader evaluation are needed to fully assess its potential and challenges.^{18,19}

METHODS

Study Design and Setting: This study was an interventional, non-randomized controlled trial in an educational experimental pre-test, post-test design, and qualitative aspects were used along with the quantitative data. Participants included a total of four groups of medical students, two experimental and two control, comprised of only 2nd-year medical students. Eight 4th year students were chosen based on their preference, teaching skill and knowledge of the subject they taught, served as tutors after a one-week workshop exploring small-group dynamics, project-based learning (PBL), and clinical skills instruction, which was taught by the principal investigator (the intervention). These were tutors who taught three-one-hour sessions on subjects from the basic medical sciences module (which contains anatomy, histology, biochemistry, physiology, immunology, microbiology, pathology, pharmacology, and radiation physics) and used PBL and skill-based teaching strategies.

Sampling: The study was conducted at Ahfad University for Women- School of Medicine in Omdurman, Sudan, chosen for its established peer-learning culture and PBL curriculum. Participants were non-randomly recruited based on voluntary enrollment provided that the participant was a student, female, of any age, in the 2nd, or 4th year, with the 2nd year groups then randomly assigned via an online team generator. Each group comprised 15 students, adhering to medical education guidelines for small-group sizes (4–20 students).

Data Collection and Statistical Analysis: Academic performance was assessed using end-of-module exam scores from the Basic Medical Sciences 1 (pre-intervention) and 2 (post-intervention) modules. With the help of a statistician, we analyzed the data using SPSS, employing paired t-tests to compare pre-post scores within groups, Mann-Whitney U tests to evaluate differences between in-

Table 1. Showing the intervention group marks in the exam before (Basic Module 1) and after (Basic Module 2) intervention. (n= 15)

Tutees	Basic Module 1 Mark	Basic Module 2 Mark
Student 1	50	51
Student 2	43	54
Student 3	70	71
Student 4	70	73
Student 5	45	55
Student 6	46	61
Student 7	41	61
Student 8	63	56
Student 9	56	59
Student 10	51	46
Student 11 ‡	0	52
Student 12 ‡	0	55
Student 13	70	66
Student 14	78	62
Student 15	43	45

‡ Student was absent in Basic Module 1.

tervention and control groups, and Spearman’s correlation to explore relationships between tutor and student outcomes.²⁰⁻²²

Ethical considerations: Written informed consent was obtained from all participants after explaining the study’s purpose and procedures. Confidentiality of personal data (e.g., names, contact details) was maintained, with identifiers disposed of post-study. Ethical approvals were secured from both Ahfad University and the University of Khartoum’s (Khartoum, Sudan) Faculty of Medicine research ethics committees. This study was designed to evaluate the impact of peer assisted learning on academic outcomes, utilizing the institution’s existing educational frameworks. The paper is based on a master’s thesis completed as part of a Health Professions Education degree.

RESULTS

Our study included eight fourth year students as peer teachers, and 30 students from the second year as peer learners, divided into intervention and control groups containing 15 students each.

Examining the data for both groups in **Tables 1 and 2**, the control group showed slightly greater difference. However, there was no statistically significant difference in score improvements between the two groups, (P value for the pre- and post-tests were 0.9 & 0.6, respectively).

Although the control and intervention groups showed similar distributions on the Basic Module 1 pre-test and Basic Module 2 post-test, inferential testing confirmed these similarities were not statistically significant. Specifically, Mann-Whitney U analyses yielded $U = 101.5$ ($Z = -0.46$, p

Table 2. Depicts the control group marks in the exam before (Basic Module 1) and after (Basic Module 2) tutoring intervention. (n= 15)

Tutees	Basic Module 1 Mark	Basic Module 2 Mark
Student 16	48	42
Student 17	66	73
Student 18	68	74
Student 19	45	49
Student 20	54	55
Student 21	61	70
Student 22	54	52
Student 23	42	50
Student 24	40	45
Student 25	66	71
Student 26 ‡	0	53
Student 27	59	58
Student 28	58	60
Student 29	72	80
Student 30	62	63

‡ Student was absent in Basic Module 1.

Table 3. Depicts the student tutors CNS module exam results, the exam after intervention. (n= 8)

Tutors	CNS Module exam Marks
Student tutor 1	40
Student tutor 2	65
Student tutor 3	62
Student tutor 4	77
Student tutor 5	57
Student tutor 6	63
Student tutor 7	55
Student tutor 8	60

= .648) for the pre-intervention assessment and $U = 107.0$ ($Z = -0.23$, $p = .819$) for the post-intervention assessment, indicating that the intervention did not produce a measurable change in learner performance relative to the control. Moreover, the intervention-group participants demonstrated a mean increase of 9.4 points between the Basic Module 1 pre-test and the Basic Module 2 post-test (SD of the paired differences = 20.0). However, a paired-samples t -test showed this improvement to be non-significant, $t(14) \approx -1.82$, $p = .091$, 95% CI [-20.50, 1.70]. This suggests that while there was a numerical gain following the intervention, it did not rise above chance variation in this sample. For the control group, although the learners showed a mean improvement of 6.7 points between the pre-intervention and post-intervention assessments, this change was not statistically significant, $t(14) = -1.91$, $p = .076$, 95% CI [-14.14, 0.81]. In other words, any observed score increase

in the absence of intervention may reflect chance variation rather than a systematic learning effect.

Contrary to our expectation that higher tutor performance (table 3) might translate into better tutee outcomes, Spearman's rank-order correlation revealed a weak negative association between tutors' and tutees' post-intervention scores ($\rho = -0.17$, $n = 8$, $p = .693$). This non-significant result suggests no evidence of a relationship between tutor proficiency and tutee achievement following the intervention.

DISCUSSION

The finding that peer-assisted learning is not particularly effective in the School of Medicine at Ahfad University for Women was demonstrated by this study, as evidenced by the non-significant difference in exam results between the intervention group and the control group, along with the weak negative correlation between the results of tutors and tutees. Few studies in health professions align with or support our findings. Among them, Batchelder et al. did not find a significant difference in exam results between the groups of students they studied; moreover, they did not observe a notable difference in students' perceptions of their confidence in knowledge, ability to integrate knowledge, or familiarity with the format of the target examination.²³ Similarly, researchers at the College of Dentistry at the University of Dammam found that peer-assisted learning groups did not lead to significant improvements in examination scores. They also noted that group attributes, such as the academic performance of peer tutors, had less impact on outcomes than individual student attributes. The lack of improvement in health professions students' scores has been reiterated and emphasized in numerous reviews, reports, and studies, which indicated either no significant difference or no improvement at all. This was evident in both written assessments (during the preclinical and clinical phases) and clinical assessments.²⁴⁻²⁶

Our findings may be influenced by several factors identified in the literature, which may pertain to tutors, tutees, or both. Tutors may struggle to address complex or technical subjects that require in-depth explanations and expertise due to a lack of sufficient understanding. This can lead to inadequate explanations and potential misunderstandings among their peers. Additionally, peer tutors may not always possess the same level of expertise as qualified instructors, which can result in the dissemination of incomplete or inaccurate information. This lack of proficiency can undermine the learning experience, particularly in subjects where accuracy is critical. Consequently, students might miss essential concepts or details due to insufficient guidance from their peers. While some students thrive in collaborative settings, others may feel overwhelmed or burdened by the perceived workload, leading to dissatisfaction with the peer-learning model. The School of Medicine at Ahfad University for Women has not yet incorporated Peer-Assisted Learning (PAL) as an official learning and assessment method; however, it has functioned for years within the school as part of a hidden curriculum. An organized proto-

col derived from an official curriculum would be a crucial starting point on the path to an effective PAL program.²⁷⁻³¹

LIMITATIONS

This study is limited by its quasi-experimental methodology, which lacks the elements of blinding and randomization, thereby introducing the potential for bias during the research process. It is also limited by small sample size, which may introduce additional bias and variation in the findings.

CONCLUSION

This research investigates the effectiveness of peer-assisted learning at the School of Medicine at Ahfad University for Women in Omdurman, Sudan, revealing that it does not significantly improve exam results compared to traditional learning methods. The study found a weak negative correlation between the performance of tutors and their tutees, suggesting that tutors may lack the necessary expertise to effectively teach complex subjects, leading to misunderstandings and incomplete information being shared. This inadequacy can hinder students' grasp of essential concepts, particularly in critical subjects. Additionally, while

some students benefit from collaborative learning, others may feel overwhelmed, resulting in dissatisfaction with the PAL model. Although PAL has been informally integrated into the curriculum, the study emphasizes the need for a structured approach based on an official curriculum to enhance its effectiveness in the future.

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CONFLICT OF INTEREST

The author have no competing or conflict of interest to declare.

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