

Research Article

The Effectiveness of Teacher Feedback in Augmenting the Academic Performance of Medical Students

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Abstract

Background: Feedback provides clarity on learning intention such as understanding, performance and acquisition of required skills. Regular feedback sessions, scheduled after each academic assessment, could help the students in improving their educational performance.

Objective: To evaluate the effectiveness of feedback on academic growth of undergraduate medical students.

Methods: It was a quasi-experimental study. Seventy-seven undergraduate medical students from academic year 2023 were randomly assigned to 18 teachers. Formal feedback was given to the students after first formative assessment followed by second formative assessment, conducted two months after the first one. Marks achieved in first and second formative assessment were compared through paired t test. A p value ≤ 0.05 was considered as statistically significant.

Results: The mean score of students in the exam conducted after feedback program was significantly higher than their previous performance (63.31 ± 1.51 vs 52.08 ± 1.52 , p value < 0.0001). Feedback helped girls achieving significantly higher increment in their marks as compared to boys (67.85 ± 1.66 vs 59.72 ± 2.22 , p value < 0.0001). Also, in comparison between students scoring $> 50\%$ and the students scoring $< 50\%$ marks in their first formative assessment, feedback proved more effective for the former group (68.92 ± 1.34 vs 53.67 ± 2.59 , p value < 0.0001).

Conclusion: Feedback program ensures significant progress in academic performance of undergraduate medical students. Such programs should be incorporated regularly in the academic calendars of medical teaching institutes to promote student's personal and professional development.

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Introduction

Feedback is a strategic component of learning process. Active listening and sharing of opinions

between teachers and learners can be helpful in managing student stress. Constant feedback to the students, regarding their performance in assignments and monthly assessments, could help them in reflecting their academic progress and groom them professionally as well.¹ This positive faculty-student relationship benefits not only medical undergraduates but also remarkably enhances the quality of education of teaching hospitals.²



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Effective feedback is quite helpful in analyzing the factors responsible for the student failure and finding out their solutions.^{2,3} The facilitator determines the learner's level of knowledge and skillfulness, helping them in devising an effective study plan to reach their learning goals.³ The success of feedback program relies on addressing challenges identified through monitoring ongoing academic progress of students.⁴ Corrective feedback are most widely used all over the world with remarkable impact on academic performance.⁵ These students are also more likely to do the classroom assignment on time and communicate more easily in the class discussions.^{6,7}

Hattie's meta-analyses of feedback indicate effect sizes of almost double the rate of learning compared to the 0.40 growth expected from a standard year's statistic. The impact of feedback varies, with effect sizes ranging from $d = 0.38$ to $d = 0.87$, depending on the feedback source. Recent meta-analyses on the effectiveness of computer-based writing feedback have found effect sizes ranging from $g = 0.55$ to $g = 0.86$.⁸ A meta-analysis comprising of 32 studies with mean effect size obtained as 0.72 ($SE=0.07$, $p < 0.05$) showed that effect size correlates with type of feedback. Student initiated feedback ($d=1.16$) and adult initiated feedback ($d=0.69$) have larger effect size compared to computer initiated formative feedback ($d=0.42$).⁹ Another study conducted to find student's perceptions about the effect of formative assessment reflected a higher level of agreement ($mean=3.76$, $SD=0.711$).¹⁰

The standard of education is one of the major contributor in success of any health system. In order to foster deeper learning strategies, it is important to acknowledge the student with his ongoing academic growth to highlight the fields that need to be addressed. The current study is designed to understand how feedback affects students' educational performance. Additionally, this research can guide the development of personalized feedback mechanisms, ensuring that students receive the support they need to reach their full potential. The purpose of this study is to explore the effectiveness of formal feedback on the academic performance of undergraduate medical students.

Methods

A formal feedback was given to the undergraduate medical students as a quasi-interventional program after ethical approval by Institutional Review Board, Services Institute of Medical Sciences, Services Hospital, Lahore, Ref# IRB/2023/1134/SIMS, dated: 06.07.2023. Students of 3rd year MBBS, Services Institute of Medical Sciences, Lahore from academic year 2023 were selected for the study via convenience sampling and informed consent was taken. The feedback program was implemented in Department of Pharmacology from 10th to 15th July 2022 after first formative assessment has been made. Total of 85 students actively participated in this study. Each of them was assigned to one of the departmental teachers. Sample size was authenticated by using information about the effect size and other parameters from a similar study conducted by C Johannes & A Haase.¹¹ A questionnaire was developed based on literature review of the previous studies regarding challenges faced by undergraduate students.^{3,4,5,7}

The questions were prepared to elicit the teacher's views on student's issues such as time management, psychosocial well-being, learning environment and intrinsic motivation (Table No.1).^{12,13,14} Facilitators discussed each component of smart study techniques: read, review, recite, revisit, with their students in detail.^{15,16} Students were advised to participate in small group discussions and enhance their cognitive capabilities, under supervision of teacher.¹⁶ The second formative assessment was conducted two months after the feedback session. The mean marks scored by the students in the second assessment were compared with the pre-program assessment using paired t-test. The difference between the pre and post feedback test score was marked as measuring criteria to analyze the effect of feedback on academic performance. A p value ≤ 0.05 was considered as statistically significant. SPSS 20.0 software was used for all statistical analyses.¹⁵

Results

Feedback program has a significant impact on academic growth of third year MBBS students as reflected in the marks achieved in their post-program exam. Twenty-seven students out of total participants

were grouped as 'Students at risk'; scoring marks < 50% in their first formative assessment. While around

Table 1: Dialogue constructed for Formative Feedback Session between teacher and student in order to address factors affecting their academic growth.

Factors	Questions asked
Time management constraints	Give a rough sketch of your daily routine activities?
	How many hours are you studying outside the classroom?
	Which of the daily routine activities affect your study time in your opinion?
Learning environment	Do you ask questions at the end of the lecture?
	What distractions are you noticing during class?
	Do you participate in class quizzes?
	What learning strategies are you following?
	Which modes of assessments are more challenging for you?
Intrinsic motivation	Do you feel the urge to learn the course content?
	What encourages you to study?
	Which learning tools do you find more thought-provoking?
	How does your relationship with family and friends impact your studies?
	How do you manage your routine expenses?
Health problems	How many hours do you sleep daily?
	Do you have any discomfort or a disease that might hamper your college progress?
	Do you actively participate in sports/ extracurricular activity?
	Tell me about your eating habits.

50 students were those who scored > 50% marks and grouped as "Students not at risk". Eight students were excluded afterwards due to absence in post feedback assessment. Boys and girls are also segregated into two groups to evaluate gender-based differences in results. Students scored significantly higher marks in second formative assessment as compared to their first formative assessment (63.31 ±1.51 vs 52.08 ±1.52, p value < 0.0001, Table:2). Feedback helped girls achieving relatively higher increment in their marks as compared to boys (67.85 ±1.66 vs 59.72 ±2.22, Tabel:2). Girls scored significantly higher marks as compared to boys in pre-program assessment (55.71 ±2.29 vs 49.21 ±1.97, p value < 0.0001) as well as post-program assessment (67.85 ±1.66 vs 59.72 ±2.22, p value < 0.0001). Students who have scored > 50% marks in the first formative assessment have achieved significantly higher marks in the post-program assessment as compared to the

students who have scored < 50% marks in the first formative assessment (68.92 ±1.34 vs 53.67 ±2.59, p value < 0.0001, Table:2).

Table 2: Comparison of marks attained in formative assessments before and after feedback session

	Number of students	Marks before Feedback Session (Mean ± SEM)	Marks after Feedback Session (Mean ± SEM)	P value
Total students	77	52.08 ±1.52	63.31 ±1.51*	< 0.0001
Girls	34	55.71 ±2.29	67.85 ±1.66*	< 0.0001
Boys	43	49.21 ±1.97	59.72 ±2.22*	< 0.0001
Students scoring < 50 % marks in internal exam	27	37.78 ±1.59	53.67 ±2.59*	< 0.0001
Students scoring > 50 % marks in internal exam	50	60.48 ±0.99	68.92 ±1.34*	< 0.0001

Results are expressed as Mean ±SEM. P value < 0.0001 is denoted by * indicating significant difference as compared to control group.

Discussion

Feedback is an insightful process in which the teacher's wisdom is assimilated and adapted as needed by the student.¹ It can provide strategies to more effectively assist learners to make progress with their learning. It includes addressing students' queries, keenly observing their performance in learning tasks and guiding them about the usage of various learning methodologies in order to achieve their goals.^{14,15} Feedback about current knowledge and academic performance of students can be given by their teachers, peers and from learners to practitioners.¹⁷ This process is both supportive and constructive in stimulating academic and professional growth of medical students.^{18,19}

Researching the profound influence of teacher feedback on enhancing the daily academic performance of medical students is essential for several reasons. Medical education is rigorous and requires continuous improvement in both knowledge and clinical skills. Feedback from teachers plays a critical role in helping students identify their strengths and areas for improvement. Understanding

how feedback affects students' routine study habits and academic growth can lead to more effective teaching strategies that foster deeper learning, improve student engagement, and ultimately contribute to better clinical practice. Additionally, this research can guide the development of personalized feedback mechanisms, ensuring that students receive the support they need to reach their full potential. By exploring this topic, we can also uncover best practices in feedback delivery, promoting a culture of continuous improvement within medical education.

In the current study, feedback program was found significantly effective in influencing the academic performance of undergraduate medical students (p value < 0.0001). Similar findings were reported earlier by Fatima N and Usmani A, who observed significant increase in the marks of the students before ($M=62.47$, $SD =14.72$) to after ($M=67.16 \pm 14.53$ vs 62.47 ± 14.72 , 0.005).²⁰ The success of program was more obvious among the high achievers. Various previous research works have shown results in concordance with current study. High achievers often have a stronger foundation of knowledge with better self-regulating skills. They are more likely to comprehend, interpret and utilize the constructive aspects of feedback program as compared to their counterpart. Low achievers usually struggle with implementation of feedback due to lack of intrinsic motivation or failing to understand the feedback process at all.^{4,19,21} However Cai et al. found that formative assessment strategies did not work with high achievers, only benefitting the low achievers. This discrepancy in results could be due to lack of relevance between feedback practice and student's educational context.²²

Feedback from the teachers encourages students to be more active and participative in class activities.²¹ It also assists students in adopting and processing the task assigned by the teachers. Studies have proven that hardworking and effort made by the students evidently raise their self-esteem and help them to become self-sufficient.³ Based on the feedback program, the appropriate improvisation made by the students in the learning process raises their academic performance.^{23,24} Teacher's feedback is crucial

element for a student in order to pave their way as a successful professional.

In the current model, the process was relatively less impactful in certain subcategories of students such as male students as compared to girls and low achiever's vs high achievers. The probable reasons for this could be lack of inspiration, time management issues and poor commitment from both the ends, as revealed by Siddiq and Scherer.²⁵ In another study, Kim et al. demonstrated that female students had higher literacy levels in most computational areas.²⁶ Additionally, in the areas of strengths and weaknesses, the ratio of below-basic achievement among male students was at least two times greater than that of female students. However, Guo observed that there is no significant difference based on gender in developing self-regulated learning through formative assessment.²⁷ In another study he further stated that directive feedback had a negative correlation with male students' intrinsic motivation and a positive correlation with female students' extrinsic motivation. Further, teacher criticism only had a negative correlation with female students' intrinsic motivation.²⁸ In current study, feedback was proven quite effective in low achievers (students who gained less than 50% in their internal exam previously) in improving the post feedback test score compare to pretest (68.92 ± 1.34 vs 60.48 ± 0.99 , p value < 0.0001 , Table:1). Similarly, boys still showed significant improvement in their scores in post feedback test compared to the pretest ($59.72 \pm 2.22 \pm 1.34$ vs 49.21 ± 1.97 , p value < 0.0001 , Table:1). Feedback helps the students showing poor academic grades by providing specific information regarding their weak areas in learning strategies. When focused on their efforts while actively developing their study plan, these students help themselves overcome their discrepancies as well as boosting their confidence and eventually lead to scoring better grades.

Feedback plays a crucial role in augmenting the learning capabilities of students with vital insights into their ongoing performance, identifying area for improvement and guiding them to make necessary adjustment in order to achieve ultimate goal. Most of the studies conducted on feedback programs focused mainly on questionnaires and student surveys. In the

current research, in order to evaluate the program, we focused on a relatively more noticeable outcome; progress in formative assessments. Feedback to the students inculcated good learning habits in them encouraging in completing their tasks timely. It helped in bridging the communication gap between the teacher and the student, reducing the psychosocial stresses in students.

Due to the limited resources, focus of the current study were students of a single institute. Further studies should be carried out to assess the effectiveness of teacher's feedback on the students across multiple institutes. Also, there is limited longitudinal data on how feedback effects the academic growth of student in the long run due to short term intervention. A more prolonged study should be conducted to understand the long term influence. Increasing the frequency of such feedback program and evaluation on regular basis can offer long term benefits.

Conclusion

It can be concluded from the above study that formal feedback following formative assessment has significantly improved student's academic performance. Therefore, it is recommended that formal feedback session should be incorporated regularly in academic calendars to promote student's personal and professional development during their stay in the medical college.

Ethical Approval: The Institutional Review Board, SIMS/ Services Hospital, Lahore approved this study vide letter No Ref No. IRB/ 2023/ 1134/ SIMS.

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Author Contribution

TM: Conception & design, acquisition of data, drafting of article, critically revision for important intellectual content

TA: Critically revision for important intellectual content, final approval

TZ: Analysis & interpretation of data, drafting the

article

MK: Drafting of article, critically revision

MNI: Drafting of article

IS: Final approval of the version

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