

Introduction of Structured Feedback to Medical Undergraduate Students in the First Professional

Abstract

Context: Feedback is integral in medical education as it improves learner's knowledge, skills, and professional competence, however it is not routinely practiced in medical colleges. Therefore, the present educational research project was designed in a need-based attempt to introduce and implement a program of structured feedback in the department of biochemistry in the first professional MBBS. **Aim:** The aim was to introduce and implement a program of structured feedback in biochemistry for 1st year medical undergraduates and to collect students' and faculty perceptions about its effectiveness. **Settings and Design:** it was a prospective, nonrandomized, interventional study. **Methods:** The study was conducted over 135 first professional undergraduates with six faculties. The feedback questionnaires to assess the perceptions of students and faculty on the feedback program were designed and peer-expert validated. An educational program for giving structured feedback was designed, peer-expert validated, and introduced and perceptions of students and faculty were collected using the feedback questionnaires. The collected data were analyzed in terms of percentages, medians, modes, and satisfaction index and represented in graphs. Transcripts were prepared for qualitative data, themes were identified, and a thematic map was prepared. **Results:** Students ($n = 135$) perceived the feedback sessions to be helpful in making them aware about their learning gaps (70%) and facilitated the process of bridging the learning gaps (62%). Students strongly agreed that feedback has helped in better understanding of the topic (82%), better retention (69%), and acted as effective learning tool (68%). The faculty did not find the feedback sessions as extra burden in their routine schedule (83%). The main themes identified were "More interaction with teacher," "Increased motivation," "Student centric," "Less stressful," "Improved confidence," "Identification and bridging of learning gaps," "Improved efficacy to attempt questions," and "Improved learning." **Conclusions:** The feedback program was perceived satisfactory by both students and faculty agreeing upon more of such sessions and implementation in the curriculum in the near future.

Keywords: Biochemistry, MBBS first professional, perceptions, structured feedback

Introduction

Feedback is central in medical education to promote lifelong learning, to provide insight of learner's behavior, improve student's knowledge and skills, and to inspire goal setting. In the absence of feedback from teachers, the student has to depend on his own assessment to determine about the good performance and the areas which need improvement.

The idea of feedback is not novel. In the manuscripts of Hippocrates and other Greek physicians, there are mentions of providing feedback, although now a days, there is greater shift from trainer-based concept to learner-based.^[1] Feedback is defined as "a process whereby learners obtain

information about their work in order to appreciate the similarities and differences between the appropriate standards for any given work, and the qualities of work itself, in order to generate improved work."^[2] Rubak *et al.* in 2008 have defined feedback as specific information about the difference between a trainee's observed performance and a given standard with the target of achieving improvement in the performance of the trainee.^[3] It is worth noting that feedback is not one-time practice, but a continuous process for improvement of the performance of learners and helps in achieving one's goals in addition to the educational objectives.

The essential in effectiveness of feedback is the mentor-mentee relationship between teacher and student and a relationship built

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upon trust. Feedback should be delivered in nonthreatening environment, should be based on performance, not on the individual. It should be timely, clear, specific, and on direct observation. The nonjudgmental and descriptive feedback emphasizes positive aspects and builds confidence. It should encourage the student to reflect on his/her performance highlighting areas which need improvement and suggest measures for the same. The student and teacher should work as team for the attainment of goals longitudinally.

One of the studies has classified feedback into brief, formal, and major. The feedback given on daily basis and related to an observed action or behavior is brief, formal feedback involves setting aside a specific time for feedback, while in major feedback, one issue/concern is discussed at a time.^[4] Feedback can be verbal or written and can be given in groups or on one-to-one basis. In any of format, the main aim of giving feedback is to provide specific information to the learner to help close the gap between what is understood and what is aimed to be understood,^[5] to reduce discrepancies between current understanding/performance and desired goal,^[6] so as to help to achieve a preferred outcome. The gap can be reduced by increasing the effort and employment of effective strategies by students and helping students to specify the goal and to design effective strategies to attain the goal by the teacher. Effective feedback answers three questions: “Where I am going” (Feed Up), “How I am going?” (Feed Back), and “Where to Next?” (Feed Forward).^[6]

Although many teachers are familiar with the concept and principles of giving feedback, often it remains underused, probably because the teacher is concerned about the impact of feedback upon the trainee and upon the future trainee–trainer relationship.^[4] Sometimes, the teacher is also unaware of the utility and proper course of action to impart the feedback. Therefore, either there is no feedback or feedback in accurate format is not delivered to the students and without the feedback loop, continuous learning with continuous improvement remains incomplete, despite the untiring attempts both by the teacher and the student.

Considering the need of present day medical education, feedback to stimulate the process of learning is very necessary, however, no mechanism of providing structured feedback to students exists in our institute. Thus, the proposed educational research project was a need-based attempt to design and implement a program of structured feedback, keeping in mind the attributes of feedback.

Methods

It was a prospective study conducted in the department of biochemistry. Out of 150 first professional MBBS students, 135 consented to be part of the study, whereas 6 faculty members from the biochemistry department including the PI, one institutional expert, and one external expert participated in it. The study duration was of 9 months.

Necessary approvals were obtained from the Institutional Research Committee and Institutional Ethics Committee. Informed consent was taken from the students and only those who gave consent were included in the study. The flow chart of methodology is given in Figure 1.

Feedback program development

A program for giving structured feedback to 1st year MBBS students in biochemistry was designed through periodic discussions involving core committee members and it was peer-expert validated. The volunteering faculty members of biochemistry and other departments were sensitized and trained on “giving structured feedback to the students” by a faculty development program “Assessment in CBME” conducted by institutional and external experts. A core committee of sensitized biochemistry faculty ($n = 6$), institutional expert ($n = 1$), and external expert ($n = 1$) was constituted for development and delivery of the feedback program. Students were also sensitized for feedback by interactive sessions, which included what is feedback, its utility, models, and role of feedback in learning.

Implementation

The structured feedback program was introduced to MBBS first professional students. It involved conducting two written formative assessments on two topics in biochemistry (acid–base balance and organ function tests), followed by structured written feedback on the written assignments instead of marks or grades, verbal feedback in small groups (on the same topics covered in written assignments), and one to one need-based and target-based structured feedback (using Pendleton model)^[7] by the involved faculty of biochemistry. The topics included in the feedback program were taught to students using routine didactic lectures and demonstrations. Two theory tests were taken (one for each topic) and the question paper included structured long and short answers and reasoning-based questions. Written feedback was given on answer sheets instead of marks or grades, however the

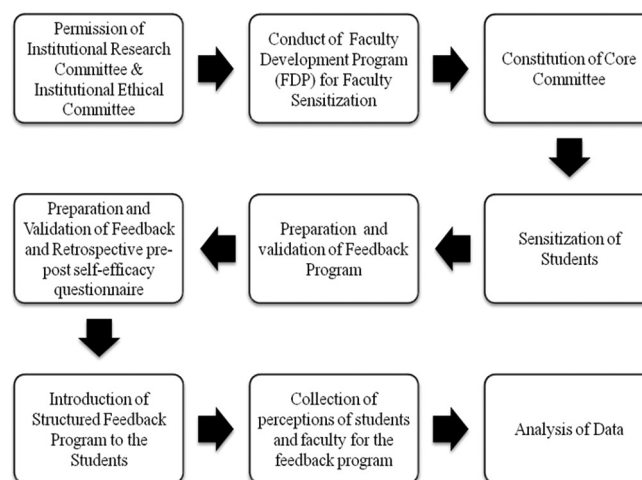


Figure 1: Flowchart of methodology

marks were recorded by the teacher for his/her personal record (not shown to the students). The written feedback was based on 5 preinformed criteria (accuracy, clarity, completeness, content, and exemplification) out of 51 as reported by Sadler.^[5] The group feedback was followed the next day after the distribution of answer sheets. Students were divided into two batches (each batch had 67/68 students, which were further divided among six faculty members); therefore, each faculty member has 11–12 students according to their roll number for group feedback. Based on the mean marks of two tests obtained by the students, the cutoff was taken as 50% and all students below 50% were given one to one feedback. A total of 42 students were below 50% and teachers involved were 06; therefore, the teacher: student ratio was one: seven (but one student at a time). The feedback sessions (both group and one to one feedback) were planned within the time frame of biochemistry tutorial hours (2 h) and for one to one feedback, 15–17 min on each student was spent within this time frame. The example of one to one feedback given using Pendleton's model is represented in Table 1.

Evaluation

A feedback questionnaire on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to assess the perceptions of 1st year MBBS students and the involved faculty on the feedback program and retrospective pre–post questionnaire on self-efficacy of students on a 7-point Likert scale (1 = Poor to 7 = Excellent) was designed and peer expert validated. The feedback questionnaire and retrospective pre–post questionnaire were administered to the students and perception of participating first professional MBBS students about the feedback program was collected. The perceptions of involved faculty on the feedback program were also taken through another feedback questionnaire.

Data entry and analysis

Collected data were entered into Microsoft Excel 2016. Faculty and students' feedback responses were analyzed in terms of percentages, satisfaction index (SI), and medians and represented in graphs. The retrospective pre–post self-efficacy feedback questionnaire was also analyzed; medians, SI, and percentage were calculated and represented in graphs. SI was calculated for each item by adopting the formula which states that $SI = (\text{cumulative score achieved}/\text{maximum possible score}) \times 100 = (\text{cumulative score for each item}/\text{number of participants} \times 5) \times 100 = ([n1 \times 1] + [n2 \times 2] + [n3 \times 3] + [n4 \times 4] + [n5 \times 5]) \times 20 / (n1 + n2 + n3 + n4 + n5)$ where n is the total number of participants with score on Likert scale for that item as mentioned in the questionnaire for that particular item.^[8,9] It means if out of 20 students, 7 students have marked 3, 8 students have marked 4 and 5 students have marked 5 as their choice on the Likert scale for a specific item, then n3 will be equal to 7, n4 will be equal to 8, and n5 will be

equal to 5 for that item. Further, transcripts were prepared for qualitative data (responses to open-ended questions), themes were identified, and thematic map was prepared.

Results

A total of 135 students of MBBS first professional of batch 2018 and 8 core committee members (6 from Department of Biochemistry) participated in this prospective, nonrandomized, interventional study.

Students as well as faculty were very much satisfied with the feedback sessions and its outcome. In the students' feedback questionnaire, 70.37% of students strongly agreed that the feedback session was helpful to make them aware about their learning gaps (SI = 94.07), while 62.22% strongly agreed that the feedback facilitated the process of bridging the learning gaps (SI = 92.14). 70% to 80% of students strongly agreed that feedback has helped in better understanding of the topic (SI = 96.59), better retention (SI = 94.51), and therefore acted as effective learning tool (SI = 93.33) and guide for further improvement (SI = 93.77). A significant number of students perceived that feedback has made them aware of the right way to attempt the questions (SI = 92.88), to look for more resource material on the concerned topic (SI = 93.48) and they feel more confident for final examination with the median value of five on a scale of 1–5. Ninety percent to hundred percent of students strongly agreed that they feel satisfied with the delivered session of feedback (SI = 92.59), their self-efficacy has improved (SI = 90.37) and they perceived that feedback should be given regularly, more of such sessions should be planned (SI = 100) and it should be incorporated in other basic subjects in MBBS first professional curriculum (SI = 90.81) [Figures 2 and 3].

The main themes identified to open-ended question—"Enlist any two good things about feedback session" in student feedback questionnaire were: "More interaction with teacher", "Increased motivation," student centric," "Less stressful," "Improved confidence," "Identification and

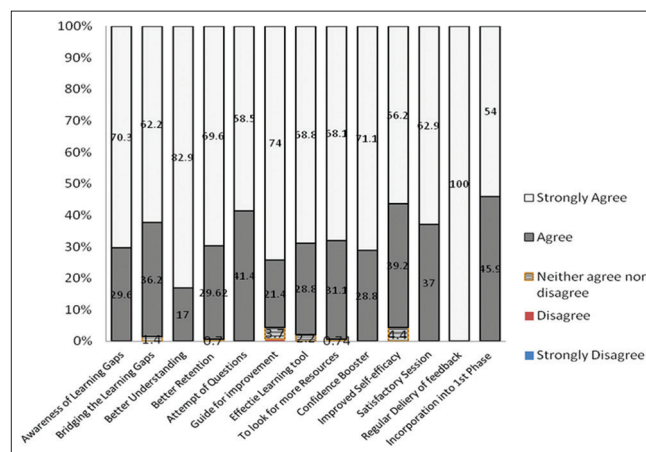


Figure 2: Perceptions of students (n = 135) about feedback session on the 5-point Likert scale

Table 1: Example of one to one feedback using Pendleton's Model

The students come and knock the door

Teacher: Come in please. Have a seat

Student: Thank you Ma'am

Teacher: How are you? Is everything going fine? Are you able to cope up with the pressure of your study?

Student: I am trying my best Ma'am

Teacher: Good, I know you can do it. Let's discuss about your written assignments. Let me inform you, this is a feedback session. As I have told you earlier we will discuss about what was good and what can we improve in our last two tests. You can discuss with me in details so that we can chalk out an action plan for the improvement in your performance. Is it OK?

Student: OK Ma'am

Teacher: Good, so tell me according to you, what you did well in your last two tests

Student: Ma'am, I represented all the mechanism of renal regulation of pH diagrammatically. For metabolic acidosis, I wrote all its clinical conditions. I was able to explain the van Den Bergh reaction in all the three types of jaundice. I also explained different clearance tests and preference of creatinine clearance

Teacher: Very nice. Moreover, you have defined buffers along with its mechanism. You have also differentiated the jaundice on the basis of biochemical tests in a tabular form

Teacher: OK, now please tell me what can be improved for these tests

Student: Ma'am I could have written all the characteristic features of dehydration. Moreover, I should have represented all hormones that are responsible for electrolyte balance and their mechanism. In altered pattern of biochemical markers for MI, I could have shown their time of rise and decline

Teacher: Yes, you could have shown their time of rise and decline in graphical pattern. This representation will make you learn easily the time of rise and decline. Moreover, you could have written biochemical findings in hypothyroidism and hyperthyroidism in a table of comparison

Student: Yes ma'am

Teacher: See, when you remember the things in graphical or pictorial fashion, it helps in learning. When you learn the things in comparison, you can easily chalk out which parameter decrease or increase in comparison to each other. Learning the concepts "if it happens" "why it happens so" will help you to learn mechanisms of various biochemical changes. So try to understand the biochemical basis for the change, in this way you can easily remember all underlying mechanism

Student: Yes ma'am, I will try

Teacher: So what is the plan for improvement in future?

Student: Ma'am, I will try to understand the biochemical basis for each characteristic feature. I will not just go for cramming of concepts, but to develop the habit of understanding underlying mechanism

Teacher: Yes, along with the underlying mechanism for each biochemical feature, try to remember the concepts in pictorial or graphical form. Try to learn things in comparison to each other like hypothyroidism and hyperthyroidism, metabolic acidosis, and metabolic alkalosis. This will help you to understand the basic biochemical concepts for each disease

Student: Yes ma'am, I will

Teacher: Good, try to develop this method and after the next test, we will have another feedback session. This will help us to check how much we have succeeded in this approach and what more we can do to achieve our goals

Student: OK, thank you ma'am. Thank you for the feedback

Teacher: OK, Good luck

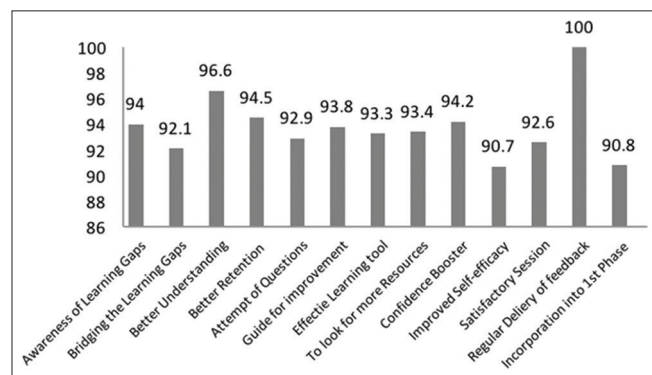


Figure 3: Satisfaction index of students (n = 135) for the feedback session

bridging of learning gaps," "Improved efficacy to attempt questions" and "Improved learning" [Figure 4].

In the Faculty's feedback questionnaire, 100% of faculty strongly agreed that learning objectives were well explained and clear (SI = 100). All faculty members perceived that the feedback session was helpful in self-assessment of learning gaps by the students (SI = 90) and therefore will facilitate the process of bridging the learning gaps (SI = 100). Further, they agreed/strongly agreed that the response of the students to the session of feedback was enthusiastic (SI = 93.33), feedback session helped in students' learning (SI = 93.33) and students will be motivated to read Biochemistry (SI = 86.66). The faculties disagreed that the session of feedback was time consuming (SI = 33.3) or it adds on extra burden in the routine schedule (SI = 23.33) with the median value of 2 and 1 on a scale of 1–5, respectively, while they agreed

that feedback can be included and implemented in the routine curriculum in the future (SI = 86.66) [Figure 5].

In the students' retrospective pre-post self-efficacy questionnaire, students perceived an increase in median self-efficacy about awareness of learning gaps (increase in SI from 44.90 to 84.86) and attempt to fill the learning gaps (increase in SI from 35.44 to 81.58) from 3 to 6 on the scale of 1-7. They also opined about increase in self-efficacy about knowledge (increase in SI from 36.29 to 82.53) and understanding of topics (increase in SI from 43.70 to 86.66), retention of knowledge of the topics included in feedback session (increase in SI from 40.84 to 84.12) and motivation to read Biochemistry (increase in SI from 41.37 to 83.49) with median increase from 2 to 6. The median for self-efficacy for awareness to appropriately attempt the questions of the topics included in session (increase in SI from 47.51 to 85.71) and confidence to attempt the topics included in feedback session in final examination (increase in SI from 48.35 to 86.24) was also increased from 3 to 6 on the scale of 1-7 [Figure 6].

Discussion

The communication of learning gaps to the students is often described as feedback. It is the mechanism which leads to the improvement of learning outcomes.^[6] It has been defined as specific information about the difference between a trainee's observed performance and a given standard with the target of achieving improvement in the performance of the trainee.^[3] Along with the improvement in the performance of the learners in terms of educational objectives, it also aims at helping them to achieve their goals.^[10]

Feedback serves not only for awareness of learning gaps but also involves strategies and suggestions to "bridge the gap." Actually, it is the trainee's awareness of the gap which acts as a stimulus for further learning.^[11] In the present study also, students as well as faculty perceived that feedback session was helpful to make students aware about their learning gaps and facilitated the process of bridging the learning gaps. Students agreed that feedback acted as an effective tool, helping in better understanding of the topic as well as retention of the topic. These findings were in consistent with Hewson and Little 1998 that feedback is central to medical education in promoting learning and ensuring that standards are met.^[12] Further in the present study, 60%-65% of students agreed that feedback motivated them to study the subject and boosted their confidence to appear in the final examination. In earlier studies also, it has been stated that feedback improves student's confidence, self-awareness, enthusiasm for learning, supports student retention, and enhances learning.^[13] Students felt satisfied with the delivered session of feedback with improved self-efficacy about the topics and these findings were consistent with the study of Bajaj *et al.*, which stated that students felt positive due to the emotional effect of feedback, motivated to work

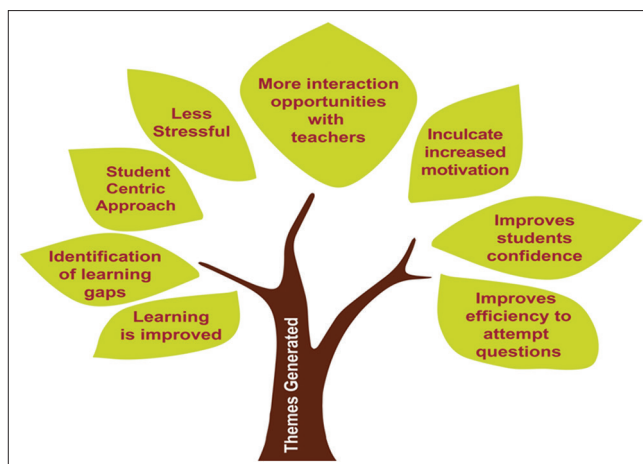


Figure 4: Thematic analysis of students' perceptions about the feedback program

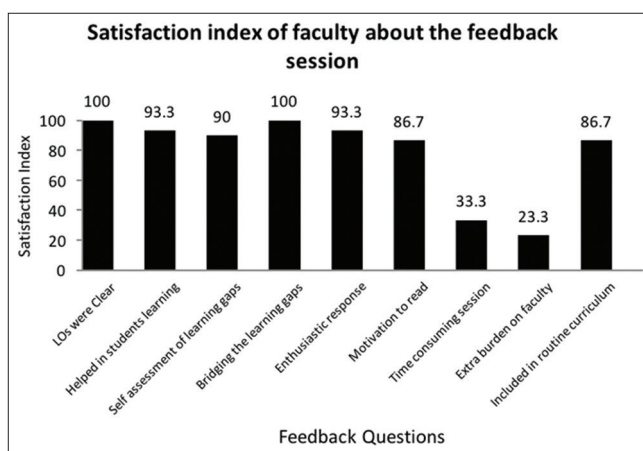


Figure 5: Satisfaction index of faculty ($n = 6$) for the feedback session

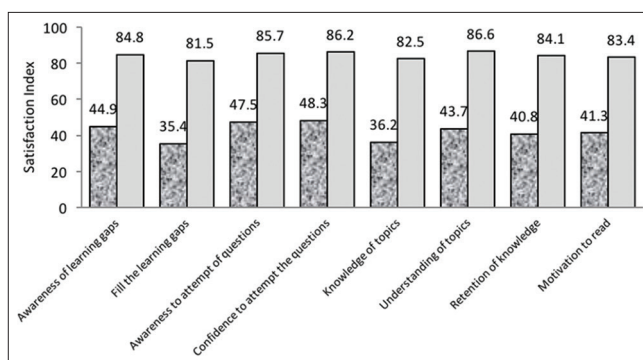


Figure 6: Improvement in perceived satisfaction index on 7-point retrospective pre-post self-efficacy questionnaire after the feedback session

hard, and were satisfied with the process.^[14] In one of the recent studies, where the students preferred verbal feedback overwritten have also observed that feedback changes the learning process and results in improvement in strategies for learning.^[15] Similarly, in the present study, the students and faculties perceived that feedback should be given regularly and more of such sessions should be planned supporting the

findings of previous studies that the feedback process should be continued throughout the session.^[14] Further, the faculties disagreed that the session of feedback was time consuming or it adds on extra burden in the routine schedule in contrast with of Vovrick *et al.*, where teachers had recognized lack of time to be an important barrier in giving one to one feedback.^[16] In the present study, there was a consensus among students about feedback being effective learning tool, motivating, boosting the confidence, and helpful in filling the learning gaps. Teachers perceived the feedback to be encouraging, motivating, and helping in increasing attention, interest, and enthusiasm of students. The students and the teachers wanted the process of feedback to be continued throughout the session as well as insisted its necessity for implementation in other subjects of this phase.

Conclusions

The feedback session was useful and helpful in conveying its message. Students' self-efficacy was improved for awareness and attempt to fill the learning gaps. The understanding and retention of knowledge about topics included in the feedback session and confidence to attempt the topics in the final examination was also enhanced. Students as well as faculties were very much satisfied with this session and its outcome. Overall, first professional students were enthusiastic and the same is reflected from their feedback on the improvement for the feedback program; their feedback was constructive and specific. The students also felt that feedback sessions should be for more time, each topic and in all subjects of their first professional year.

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Ethical clearance

Study was conducted after approval from the Institutional Ethics Committee.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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