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Original Article

Pharmacology Section

Introduction of Feedback for Better Learning

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ABSTRACT

Introduction: Feedback provided during formative assessment guides students to close the gap between their current and desired performance and enhances their learning and satisfaction. To get positive impact of feedback, it should be effective and timely. Perceptions and preferences of students for feedback may vary based on their attitude, cognitive style, gender and many other factors. Teachers may have different perceptions than the students about feedback. So present study tries to introduce feedback in the formative assessment of pharmacology and understand perceptions of students and teachers towards it.

Aim: To provide effective, timely feedback to students for giving desired direction to learning and also, to assess students' and teachers' perceptions of feedback.

Materials and Methods: A session on importance and techniques of feedback was conducted for sensitisation of faculty. Evidence-Effect-Change (EEC) technique was selected to provide feedback to students during formative assessment in tutorials and tests. A total of 150 students of third semester were divided into two batches for practical classes on alternate days. Each batch was subdivided into six subgroups. They were given one to one and face to face feedback, eight times in a period of four months, during tutorials and after tests of General pharmacology and Autonomic nervous system conducted in practical classes. The perceptions and preferences of students and teachers were recorded on self structured, prevalidated questionnaires using five-point Likert's scale. Data were analysed using frequency distributions and median as measure of central tendency. Open ended questions were analysed descriptively.

Results: There was consensus among students that feedback provided was effective, timely and had positive emotional effects. The students agreed having received feedback on all mistakes with corrections, content, organisation of content and handwriting. 88% students wanted the feedback process to be continued. Students (n=7) also suggested that more time should be spent by teachers in providing individual feedback to each student.

All teachers agreed that during feedback they gave more emphasis on correcting mistakes, clarifying doubts and motivating students to work hard. 83% of teachers said that because of time constraint, all students didn't get equal feedback and they spent more time giving feedback to academically weaker students who were consistently scoring less than passing marks. Teachers suggested that students should be divided into groups based on their performance and group feedback can be easily provided.

Conclusion: Feedback has positive constructive effect on students' emotions and learning. A large majority of students as well as teachers want feedback process to be continued throughout the session, but there is a difference in opinion of teachers and students about one to one or group feedback.

Keywords: Evidence-effect-change technique, Formative assessment, Perceptions, Pharmacology

INTRODUCTION

Global quality movement seeks accountability in all aspects of higher education and emphasises student centred learning [1]. Students need feedback from their assessment as a part of their demand for quality education. Thus, feedback provided during formative assessment is an important aspect of 'Quality Accountability' of Institutions and enhances student satisfaction and learning in tutorials [2]. It helps students to know 'what they have accomplished' and 'how far they are from their learning goals' [3].

In a broader sense, the term 'feedback' means all dialogue to support learning in both formal and informal situations [4]. Hattie JA et al., defined feedback as "information provided by an agent (e.g. teacher, peer, books, parents, self, experience) regarding aspects of one's performance or understanding, thus being a consequence of performance" [5]. More specifically feedback is defined as "information about the gap between the actual level and reference level of a system parameter, which is used to alter the gap in some way" [6]. In other words, feedback is the process of guiding the students to close the gap between their current and desired performance [7].

Studies on formative assessment indicate feedback and learning to be inseparable [8] as feedback motivates students by reinforcing and recognising their efforts [9] and leads them to a deeper understanding of the topic. According to Weaver MR, feedback is useful to students only if given timely [10]. But in most instances, students get feedback after completion of course and 'timely feedback' is still a cause of concern in higher education [11]. Ideally, formative assessment should be planned in such a manner that students receive feedback well in time so that they can use it to improve their performance in final examinations or summative assessment [12]. Hattie JA et al., observe that although feedback places much demand on teachers' as well as students' time, it does promote learning. In addition to time, the quality aspect of feedback is equally important. Factors like lack of comprehensibility, inadequacy of information, poor handwriting and judgemental comments may compromise the quality of feedback for students [5].

There are reports of interaction between preferences for feedback and student characteristics like attitude, personality, cognitive style, strategies [13], gender [14] etc. Medical students are reported to strongly prefer individual feedback [15]. Further, there are differences between perceptions of students and teachers about feedback. Tutors may not recognise the positive impact of assessment feedback on students [16].

So present study was conducted with aim of providing effective, timely feedback to students for giving desired direction to their learning process and assessing students' and teachers' perceptions/attitude towards feedback.

MATERIALS AND METHODS

The Questionnaire based, interventional study was conducted after Approval by Institutional Ethics Committee and waiver of documented consent. The study was conducted on 2nd professional, 3rd semester MBBS Students and faculty members in the Department of Pharmacology, for a period of four months from October 2017 to January 2018.

Second professional, third semester MBBS students, who have cleared all subjects of first professional and faculty members in Department of Pharmacology, with minimum qualification MD pharmacology and more than five years of teaching experience were included in the study. However, students who have to appear in supplementary examination of first professional MBBS and tutors/demonstrators who were not MD pharmacology were excluded.

Procedure

A session on "Significance of feedback in student learning" and "various techniques of giving feedback" lasting one hour was conducted in which faculty members of Pharmacology Department (n=6) and 'Medical Education Unit' members participated. All faculty members were postgraduates with minimum five years of teaching experience. Four techniques of providing feedback i.e., sandwich technique, stop-start-continue technique, Evidence-Effect-Change (EEC) technique and Pendleton's technique were discussed in detail. EEC technique was chosen by consensus to provide feedback to students after tutorials and tests. EEC technique of feedback focuses on improvement, uses strictly clinical tools and purposely lacks emotional terms. In this technique, first of all, 'evidence' of inappropriate/suboptimal performance was shown to learner followed by examination of 'effect' of that deviation and then desired 'change' was highlighted [17].

After verbal consent, 150 students of second Professional MBBS (third Semester) were divided into two batches A and B for their practical classes scheduled on alternate days. Each batch of 75 students was further divided into six subgroups. One subgroup comprising of 12-13 students from each of batches A and B was allotted to every faculty member for conducting feedback sessions during practical class time. One to one and face to face feedback was provided using EEC technique during three tutorials of General Pharmacology. The process was repeated after class test of General Pharmacology. The batches of students were rotated among faculty members and whole procedure was repeated during three tutorials and class test of Autonomic nervous system. In this way, students received feedback from teachers for eight times in a period of four months. Learners with poor performance (less than 35% marks) were gently inquired about possible reasons for suboptimum performance and guided to overcome the same. Students clearing the tutorials and tests were motivated to work hard for further improvement. Top performers were encouraged to maintain consistency of their performance throughout the session.

The perceptions of students and teachers about feedback were recorded on self-structured, prevalidated questionnaires using five point Likert's scale. Reliability of questionnaires was checked by test-retest correlation, which was r=0.71 for student's perceptions questionnaire and 0.73 for teacher's perception questionnaire. The self-structured questionnaire for recording students perceptions [appendix 1] was validated by 10 students of fifth semester MBBS who were not part of study group. All the items were content validated by raters for readability, clarity and comprehensiveness by using dichotomous rating. It comprised of 18 questions divided into four subsets. The first set queried about the basic information of type of feedback provided by teachers after tutorials and written tests i.e., the content/concepts, its organisation, handwriting, presentation, mistakes and suggestions to correct them. The second set of questions tried to elicit whether students perceived the feedback to be effective, and timely. The next two subsets were to gauze their emotional reaction to the feedback and whether they want it to be continued throughout the session. Open-ended questions were also asked about suggestions to improve it further.

The questionnaire for recording perceptions of teachers [appendix 2] was also content validated by 'Medical Education Unit' members using dichotomous rating. It consisted of six questions to be answered on five point Likert's scale and four open-ended questions.

STATISTICAL ANALYSIS

Data were collected and analysed by descriptive statistics, frequency distributions and median as a measure of central tendency, using SPSS software, version 19.0.

RESULTS

A total of 125 students of second professional MBBS and six faculty members of Department of Pharmacology participated in the study. The age range was 18-21 years for students and 34-48 years for faculty. A total of 69 (55.2%) students were females and rest 56 (44.8%) were males. Five (83.3%) faculty members were females and 1 (16.6%) male.

Student's Perception of Feedback

The filled questionnaires were returned by 125 students and six faculty members. Students (n=25) absent on day of filling the questionnaire were dropped from study.

Large majority of students agreed having received feedback on all mistakes with corrections, content, organisation of content and hand writing or presentation in that order.

Frequency distribution of student responses regarding effectiveness of feedback (with median Q_2=4.32) indicated that there was a consensus among respondents that feedback was effective as shown in [Table/Fig-1]. Out of a total of 494 responses to four Likert's items about effectiveness of feedback, 227(46%) were 'strongly agree' and 207 (42%) of responses were 'agree'.

[Table/Fig-1] shows consensus among students that feedback was timely (Q_2=3.79) when they still had time to bridge the gap. Out of 125 students, 38.8% strongly agreed and 43.6% agreed that feedback was given well in time when they still had time to revise their work and improve the performance.

Emotional effect of feedback: As shown in [Table/Fig-2], there was a strong consensus (Q_2=4.56) among students that they felt positive emotional effect of feedback like being taken care of by their teachers, motivated to work hard and were satisfied with the process. A total of 24 (7.9%) responses were however neutral for positive emotional effects. While evaluating the emotional effects of feedback, instead of total number of students (125), total number of responses was considered. This method was chosen because every student cannot be expected to experience each and every emotional effect with feedback sessions. For example, if prominent emotional impact on a particular student is that he feels cared for, he may not mark anything against other Likert's items for emotional impact. So, the total number of responses (n=305) against Likert's items indicating positive emotional impact (cared for, motivated, satisfied) were used as denominator, instead of total number of participants for computing the results. Same strategy was adopted for negative emotional impact.

Out of 253 responses, only 2 (0.79%) were strongly agree for negative emotional effects like humiliation and frustration. A total of 38 (15%) responses were neutral for negative emotional effects of feedback.

S. No.	Likert Items	Strongly disagree 1 n (%)	Disagree 2 n (%)	Neutral 3 n (%)	Agree 4 n(%)	St. Agree 5 n (%)	Non respondents n (%)
1. Type of Feedback n=125							
1.	All mistakes and corrections	3 (2.4)	3 (2.4)	9 (7.2)	35 (28)	72 (57.6)	3 (2.4)
2.	Content	1 (0.8)	1 (0.8)	13 (10.4)	46 (36.8)	63 (50.4)	1 (0.8)
3.	Organisation of Content	1 (0.8)	1 (0.8)	18 (124.4)	44 (35.2)	59 (47.2)	2 (1.6)
4.	Handwriting and Presentation	3 (2.4)	3 (2.4)	26 (20.8)	41 (32.8)	50 (40)	2 (1.6)
2. Effectiveness of Feedback n=125							
1	I Receive one to one and face to face feedback	1 (0.8)	3 (2.4)	8 (6.4)	50 (40)	60 (48)	3 (2.4)
2	There is high level of interaction with teacher	1 (0.8)	1 (0.8)	15 (12)	53 (42.4)	54 (43.2)	1 (0.8)
3	All my doubts are clarified	1 (0.8)	1 (0.8)	10 (8)	52 (41.6)	59 (47.2)	2 (1.6)
4	I find feedback helpful in my learning	0 (0)	1 (0.8)	18 (14.4)	52 (41.6)	54 (43.2)	0 (0)
	Total Responses (494)	3 (0.6)	6 (1.2)	51 (10)	207 (42)	227 (46)	
	Median Q_2	4.32					
3. Timely Feedback n=125							
1	I receive timely feedback when there is still time to improve and correct my mistakes	3 (2.3)	1 (0.79)	18 (14.2)	55 (43.6)	48 (38.8)	0 (0)
	Median Q_2	3.79					

[Table/Fig-1]: Type, effectiveness and timeliness of feedback.

S. No	Emotional Response	Number of responses				
	Positive Emotions	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
1	Cared for	2	2	8	35	58
2	Satisfied	2	2	8	42	52
3	Motivated	2	-	8	32	52
	Total Responses N=305	6 (1.96%)	4 (1.3%)	24 (7.9%)	109 (35.7%)	162 (53.1%)
Median Q_2=4.56 indicates consensus						
S. No	Emotional Response	Number of responses				
	Negative Emotions	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
4	Disappointed	49	21	13	-	-
5	Humiliated	45	21	7	-	1
6	Frustrated	52	25	18	-	1
	Total Responses N=253	146 (57.7%)	67 (26.5%)	38 (15%)	0	2 (0.79%)

[Table/Fig-2]: Emotional effects of feedback on students.

A large majority n=110 (88%) of students wanted feedback to be continued throughout the session.

Descriptive analysis of responses of students to open ended questions showed varied suggestions. Twelve (9.6%) students suggested a separate session for clarification of doubts to be arranged before written test of each topic and 28.8% (n=36) demanded answer sheets with written remarks to be returned to students for future use. Some students (n=7) suggested more time to be devoted to each student during feedback sessions. A few (n=3) suggested that other departments should also be persuaded to start the feedback sessions.

Teacher's Perception of Feedback

Teachers' perception questionnaire consisted of six Likert's items to be answered on 5 point scale. [Table/Fig-3] shows teachers' (n=6) perceptions of the feedback process.

Descriptive Analysis

In response to open ended question that whether all students were given sufficient and equal feedback, only one teacher responded in affirmative. Rest of them (n=5) said that because of time constraint all students didn't get equal feedback. They also felt that academically weaker students needed more support and feedback as compared to good students. So, they spent more time giving feedback to such students.

All the teachers preferred giving encouraging feedback to motivate the students and boost up their morale. Two faculty members, however, admitted providing both encouraging as well as criticising feedback, so that students may not become overconfident and stop working hard.

All teachers agreed that during feedback they gave more emphasis on correcting mistakes of students, clarifying their doubts and motivating them to work hard. Students have also admitted that they get such encouraging and corrective feedback. Hence in the present study, there were a consensus among students and teachers about the 'type of feedback' and 'emotional aspect' associated with it and students perceived the feedback as given by the teachers.

S. No	Likert Items	Strongly disagree 1 n	Disagree 2 n	Neutral 3 n	Agree 4 n	St. Agree 5 n
1	Providing feedback helps students in better conceptual understanding	-	-	1	3	2
2	Increases participation of students	-	1	1	2	2
3	Increases motivation of students	-	-	3	2	1
4	Improves teachers- students interaction	-	-	-	4	2
5	Improves performance	-	-	4	2	-
6	Should be continued	-	-	2	4	-

[Table/Fig-3]: Teacher's perception of feedback.

It is interesting to note that although four teachers agreed but two teachers were uncertain about continuing the practice of feedback for rest of the session as compared to 68% students who strongly agreed and another 20% who agreed that practice of feedback from teachers should be continued in future also.

The teachers were of the view that individual feedback involves a lot of repetition on the part of teacher and is time consuming. Thus, it was difficult to provide detailed individual feedback to each and every student. They suggested that students may be divided into groups based on their performance and 'group feedback' should be provided. This would decrease the repetition and allow more time to be devoted to each group for detailed discussion. In sharp contrast students had suggested continuing individual feedback and more time given by teachers to each student.

DISCUSSION

Feedback system that helps students in realising their learning goals is an indispensable part of student-centred curriculum [18]. Feedback from some external source reportedly plays a crucial role in helping learners to reflect on their own abilities and motivates them to work on detected deficiencies. Such self-assessment by reflection forms the basis of skill improvement with practice [19]. Thus feedback has potential to improve the performance by aiding in acquisition of brilliance in clinical, communication and other professionally relevant skills [20,21].

In the present study 2nd professional, 3rd semester MBBS students found feedback to be useful and effective, as they experienced high level of interaction with teachers, got their doubts clarified and felt motivated to improve performance during feedback sessions.

In the present study, students perceived feedback to be well in time (Q_2=3.79). Importance of timeliness of feedback to make it relevant has always been stressed [22]. Timely given feedback is advantageous, as it allows time needed for implementation of corrective actions [23] and reinforcement of corrected behaviours during practice [24]. This results in positive impact of feedback on performance [25]. In fact, feedback has long been recognised to have most powerful influence on student achievement [26,27]. This probably is the reason for 'skill of providing feedback to students' being considered a key benchmark in effective teaching and supervision [28]. Students view feedback not only as a marker of good teaching [29] but also as a top indicator of clerkship quality [30].

Majority of learners in the present study experienced positive emotional effects of feedback from their teachers. Similar results have been reported by many other studies [24,31], where feedback to medical students about their competencies is documented to be a strong motivating factor, greatly enhancing their satisfaction. A large percentage (88%) of present students wanted the practice of giving feedback to be continued in future also. Many reports in literature affirm that students want and value quality feedback [9,32]. Kim J et al., also reported that medical students desire feedback in a more systematic and timely manner [33].

In the present study, there was a consensus between students and teachers about the type of feedback which is largely corrective and encouraging. However, the opinions of teachers and students regarding group or individual feedback were diagonally opposite. Teachers suggested group feedback because of time constraint. In a study by Vovrick LJ et al., teachers had recognised lack of time to be an important barrier in giving feedback [34]. However in sharp contrast, students in the present study demanded individual feedback and more time for each student. Parikh A et al., also reported that medical students prefer individual feedback [15]. Such significant discrepancy between student and teacher perception of content, quality and quantity of feedback is reported by Thomas JD et al., also [35]. Thus, the process of providing individually tailored doses of feedback to students on their performance is highly interactive and seems to be the most effective, concrete way to help medical students learn a vast, volatile and dynamic subject like Pharmacology.

The study confirms that students value effective and timely feedback as it plays a significant role in their learning. The strength of the study was that the technique of providing feedback was selected by consensus and teachers were sensitized before starting feedback sessions. During feedback sessions, teachers, as well as students, participated enthusiastically. Students found feedback to be so useful in their learning, that they not only wanted the process to be continued in pharmacology department but suggested persuading other departments to follow the same. However, there was a lot of time constraint and repetition on part of teachers, it would have been better to divide students into batches based on their performance rather than alphabetically. Group feedback is not as time-consuming as individual feedback and may have all useful effects of the latter, if group being addressed is uniform. Secondly, the corrected answer sheets of written test should have been returned to the students for future use as demanded by them.

LIMITATION

The limitation of the study is that it was conducted on 2nd professional medical students in Pharmacology Department in single Institution. The technique of providing feedback and perception of students as well as teachers towards it may vary from one Institution to other and even from one department to other within the same Institution. So results of the present study may not necessarily apply to all the learning environments.

CONCLUSION

The present study concludes that there was a consensus among students about feedback being useful, effective and well in time. Students perceived the feedback to be corrective and encouraging. Teachers also shared the opinion of students about type, effectiveness and timeous delivery of feedback. The majority (88%) of students and 66% of teachers wanted the process of feedback to be continued throughout the session. However, teachers and students differed on issue of individual or group feedback.

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APPENDIX 1

Questionnaire for Student's Perception of Feedback

You have been provided feedback of Gen pharmacology/ANS during tutorials and after test. What is your reaction to the feedback process. Mark your response to following questions on 5 point Likert scale from strongly disagree to strongly agree. I Strongly disagree, II disagree, III Neutral, IV agree, V Strongly agree.

I	II	III	IV	V

1. I receive teacher's feedback on
   a. content/concepts.
   b. Organisation of content.
   c. hardwriting and presentation of content
   d. all mistakes and suggestions to correct them.
2. I receive timely feedback (when there is still time to improve or correct my mistakes).
3. I receive One -to one and face -to-face feedback.
4. There is high level of interaction with teacher when feedback is provided.
5. My doubts are clarified during feedback session and there is opportunity for discussion.
6. I find feedback to be helpful in my learning.
7. When I get my teacher's feedback, I feel
   a. Cared for
   b. Satisfied
   c. Motivated
   d. Disappointed
   e. Humiliated
   f. Frustrated.
8. I feel that process of feedback should be continued throughout the session.

Any other suggestions for further improvement.

APPENDIX 2

Questionnaire For Teacher's Perception of Feedback

Name: You have provided feedback to students during tutorials/seminars and after written test. Mark your response to following questions on 5 point Likert scale from strongly agree to strongly disagree. I Strongly disagree, II disagree, III Neutral, IV Agree, V Strongly Agree.

I	II	III	IV	V

1. Providing feedback to students helps them in understanding concepts in a better way.
2. Feedback increases the participation of students in teaching-learning process.
3. Feedback increases motivation of students.
4. Feedback improves the student-teacher interaction.
5. Feedback improves performance of students.
6. I feel feedback should be continued throughout the session.
7. Do you feel you provide all students with sufficient equal feedback? If not why?
8. Do you prefer to give encouraging feedback or criticism or both. Why?
9. What issues do you consider most essential when giving feedback?

Any other suggestions to further improve the process.