RESEARCH

The Importance of Written Feedback on Individual and Team Performance

Kimberly Ference, PharmD,[a] Blake Lamberti Mackesy, EdD,[b] Paul Reinert, PhD,[b] Edward F. Foote, PharmD[c]

[a] Wilkes University, Nesbitt School of Pharmacy, Wilkes-Barre, Pennsylvania
[b] Wilkes University, School of Education, Wilkes-Barre, Pennsylvania
[c] University of the Sciences, Philadelphia College of Pharmacy, Philadelphia, Pennsylvania

Corresponding Author: Kimberly Ference, Wilkes University, Nesbitt School of Pharmacy, Wilkes-Barre, Pennsylvania Tel: 570-408-2048. Email: kimberly.ference@wilkes.edu

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Objective. To analyze the impact of written feedback using an online peer and self-evaluation system (CATME) for individual and team performance.
Methods. Student pharmacists working collaboratively on a project-based assignment to solve an authentic health-care related problem were the focus of this study. This mixed-method study utilized an online survey and focus groups to analyze perceptions of the usefulness of feedback and the impact of written feedback using an online peer and self-evaluation system (CATME) in student pharmacists enrolled in a required first-year course.
Results. The sample consisted of 61 participants 47.5% of the participants were enrolled in section A/comments included (n = 29) and 52.5% in section B/ratings only (n = 32) section of this course. For 14 of the 15 items on the survey, the mean scores were higher for section A, as compared to section B, indicating generally higher agreement with and affirmation of positive statements related to giving and receiving peer-to-peer feedback. Quantitative and qualitative data indicated an overall positive perception about the usefulness peer and self-evaluation system (CATME) for individual and team performance. More specifically, both the quantitative analysis and focus groups revealed notable differences between the group that received ratings only and the group that received both ratings and written feedback.
Conclusion. The survey results and focus group themes indicate positive student perceptions of the tool and revealed a more meaningful impact when written comments and ratings were shared with individuals.
Keywords: pharmacy education, peer evaluation/feedback, teamwork, project-based education, CATME

INTRODUCTION

Teaching teamwork and team roles/responsibilities is essential to pharmacy curricula in order to prepare student pharmacists for future practice. A related skill, the ability to give and receive effective feedback through peer and self-evaluation, is an important aspect of working on a team. Tracking and evaluating team function, team satisfaction, self-assessment and peer-evaluation within a team can be a tedious task from an instructional standpoint.

The Comprehensive Assessment of Team-Member Effectiveness (CATME) SMARTER Teamwork system is an electronic, web-based system that gathers robust data regarding the overall team experience.[1] This assessment tool allows the instructors to collect data on the quality of how well the team is functioning and how well students self and peer assess. The data collected in the CATME system is based primarily on a quantitative approach using likert-based rating scales with the option to provide open-ended self and peer feedback including discursive comments to peer team members. The system allows the instructor to hide the peer comments (visible only to instructors) or release the feedback (visible to student team members and instructors). Students can view feedback provided by peers with or without the author of the feedback identified. This unique and robust assessment tool has been studied in non-medical, educational settings.[2,3]

While studies on the impact of self and peer feedback in pharmacy curricula have been published, there is a paucity of data assessing the impact of written peer and self-feedback in a team setting. One study published in the pharmacy literature discusses the impact of peer and self-assessment on small group work in a foundational pharmacy practice course.[4] The manuscript describes the effectiveness of peer and self-assessment towards performance during a group project. Students were asked to rate team member performance using a Likert scale two times during the semester (midpoint and final). Students were also given the opportunity to provide optional written comments to individuals or the group. The authors did not formally assess the written comments, but noted the written comments were complementary. The authors measured student perceptions about the utility of peer and self-assessment using an end of semester course

evaluation. The results indicate students felt peer feedback is important to professional growth and development (64% agreement), constructive feedback aided in identification of individual strengths and weaknesses (80% agreement) and assisted with development of skills for working in a group (68% agreement).

The academic medical literature includes a manuscript describing student perceptions of peer assessment in an interprofessional setting.[5] The population of the study included health professional students from seven different fields (including pharmacy). After an interprofessional activity, students were asked to rate the feedback received from team members on a five-point likert scale for usefulness and positivity. Results from this study suggest that students felt the peer feedback was useful (means across professions = 3.84-4.27) and positive (means = 4.17-4.86).

Exposing student pharmacists to teamwork and evaluation of performance using an assessment tool early in the curriculum has the potential to enhance future competency in the team setting. This manuscript describes the importance of written feedback on individual and team performance using an online, peer-to-peer evaluation system (CATME) in a course utilizing a team-based, project-based learning model.

METHODS

Course Description

This mixed-method study took place in Foundations of Pharmacy Practice, a two semester course (2-credits each), required of all first-year student pharmacists. In order to gain an appreciation for the study methods, a description of the course and course project related to the study question will be discussed. This course provides students with the foundational knowledge, skills, and attitudes needed to enter pharmacy practice. A key component of the course is a project-based assignment in which students work collaboratively to solve an authentic health-care related problem. In teams of six, students research the problem and then create and implement a deliverable to solve, publicize or further investigate the issue. The project is designed to foster teamwork, stimulate creative thinking, enhance written and verbal communication and improve the ability to give and receive feedback. The project is divided into three phases. In Phase I, student-teams define the problem based on a literature review and produce a written report. In Phase II, students draft a potential deliverable. Examples of potential deliverables for this project include public health initiatives, research, or presentations. Phase III, includes implementation of the deliverable, a final report and an in-class presentation. At each phase of the project, students are required to provide self and peer evaluations. In past years, instructors used paper, non-standardized, peer evaluation forms to monitor team function and progress. During the 2016-2017 academic year, the instructors adopted the CATME online system for peer and self-evaluations in place of previously used non-standardized paper forms.

At the completion of each phase of the project, students completed peer and self-evaluations using the likert-based peer assessment within CATME. After completing the quantitative assessment within CATME, students provided written self and peer comments as a required component of the evaluation. Instructors opened the CATME at the end of each phase and students completed the assessment within a timeline of 48 hours for Phases I and II and five days for Phase III. After each CATME assessment was completed, the instructors reviewed the quantitative data as well as the peer comments. If the written peer feedback was not adequate (eg, the evaluation was missing detail, corrective feedback and positive comments) the instructors sent a standardized coaching email to students encouraging more thoughtful feedback in subsequent evaluations. After the evaluations were reviewed by the faculty, they were released to students.

Study Design

The researchers were interested in studying the impact of giving and receiving written peer feedback on individual and team performance. To assess this, the two sections of the course were handled differently. Students in both sections of the course used the CATME system to provide feedback to teammates using numerical ratings and written comments. The CATME data released to both sections included the quantitative rankings, but the anonymous peer-to-peer comments were only released to section A. Students were not informed that sections were being handled differently although blinding was not possible.

For the first part of the study, upon completion of the project an electronic survey developed by the research team was sent out to students enrolled in both sections of the course. Student pharmacists were asked to rate their agreement using a 5-point scale (strongly disagree to strongly agree). Data collected ratings of their performance, performance of their teammates, and receptiveness to receiving feedback. Quantitative data were analyzed using the IBM SPSS, Inc. statistical software to describe the sample and draw comparisons using the two groups Section A/comments included vs. Section B/numerical ratings only. Inferential statistics, specifically independent t-tests, were used to determine if there was a significant difference between the means of two groups. The survey asked questions related to demographic and

background (table 1) items prior to the questions about their perceptions of receiving peer-to-peer feedback. Additionally, grades for section A and section B were compared.

In addition to the survey data, a series of focus groups were conducted. To create focus groups, each student on each six-member team was assigned a number from 1 to 6. A random number generator was used to identify a student from each group whose assigned number was the same as the number randomly generated, and that student was invited to participate in the focus group. If the invited student was unable to participate, the process was repeated with each of the remaining students until four groups of four to six students were created. Not all six-member teams were represented in each focus group because not all students agreed to participate.

In addition, participants in section A, who received the discursive comments, described the impact of receiving the peer-to-peer comments and their perceptions of these comments on the effectiveness of the group. They also shared if, how, and to what extent the individual peer-to-peer feedback was different in nature and how it impacted and influenced them compared to the numerical ratings they received. Finally, participants from both class sections provided recommendations that they thought might improve the feedback process or improve group effectiveness. Through focus groups, participants shared the experience of rating their teammates, described the experience of providing individual written feedback to each of their teammates, described the experience of receiving feedback and how they responded to both constructive and positive feedback, and discussed the influence of the feedback they received on their perception of the effectiveness of the group.

RESULTS

The sample consisted of 61 participants, with equivalent demographic and background characteristics (Table 1). Of this sample, 47.5% of the participants were enrolled in section A/comments included section (n = 29) and 52.5% in section B/ratings only (n = 32) section of this course. For 14 of the 15 items, the mean scores were higher for section A, as compared to section B, indicating generally higher agreement with and affirmation of positive statements related to giving and receiving peer-to-peer feedback. The quantitative analysis included results from an electronic survey about giving and receiving feedback. Survey items revealed that three of the fifteen questions, there was a statistically significant difference between the A/comments included section (n = 29) and the B/ratings only (n = 32) section of the course. Three statistically significant differences were found, including "the feedback helped me to better understand my performance on the team," "the feedback received by the team improved group/team performance", and "this experience has prepared me to provide feedback to others in the future." Table 2 provides means and standard deviations for the online student survey, while Table 3 provides means, standard deviations, and significance levels for the survey items with statistically significant difference in the means on the survey items. Table 4 provides the distribution of the respondent's ratings of agreement with the electronic survey items. Additionally, an analysis of project-related grades noted no difference between the groups.

The overall theme of the qualitative data indicated that students perceived that giving and receiving feedback on self and team performance improved functioning and feedback was especially affirming and valuable when accompanying comments were shared.

To begin the focus group, students were asked about the experience of providing quantitative and qualitative feedback to their teammates. Students in the focus groups reported that the peer-to-peer comments were more involved than the numerical ratings and that giving negative or constructive feedback was more difficult than composing positive comments. Despite the additional time, the peer-to-peer comments were preferred by many students. The students who received the peer-to-peer comments had an overall positive perception of the survey and indicated that the feedback was well-received and thought to be accurate and fair. Conversely, students who were not able to view the peer-to-peer comments described a general disinterest in - and even disregard - for using CATME. Table 5 presents the specific comments made by the students in the focus groups about their perception of using CATME.

A similar phenomenon occurred relative to the perceived influence of the feedback on group effectiveness. Teams that received peer-to-peer comments reported a positive effect. Teams that did not receive peer-to-peer comments indicated that the feedback had little or no impact, and in some cases, a negative impact on perceived group effectiveness. Table 6 presents comments made by the students in the focus groups regarding perceived influence of the feedback.

The focus groups concluded by asking the participants for recommendations that they thought could improve the feedback process and improve team effectiveness. Suggestions included, "Having a team meeting and talk about going forward as a team and how you could all improve together." The final, and nearly unanimous, recommendation was to release the peer-to-peer comments to everyone.

DISCUSSION

This study aimed to analyze the usefulness of an online peer and self-evaluation system (CATME) for individual and team performance and the impact of peer-to-peer written feedback for those who received it. The type of feedback received differed between the two groups of participants, with one group receiving CATME ratings and written comments and the other group receiving CATME ratings only. The results of this study indicate positive student perceptions about using the CATME system and data revealed a more significant and meaningful impact when both written comments and ratings were shared with individuals.

Three items on the electronic survey revealed a statistically significant difference between the groups indicating that feedback helped students to: understand individual team performance, improve group/team performance and be prepared to provide feedback to others in the future. Students in group A (comments included) perceived the experience more positively than B (numerical ratings only) group. For 14 of the 15 items on the survey, the mean scores were slightly higher for section A, as compared to section B, indicating generally higher agreement with and affirmation of positive statements related to giving and receiving peer-to-peer feedback. For the fifteen questions on the electronic survey, the means were low indicating a general lack of comfort with giving feedback, which may be consistent with the general in-experience of first-year students.

The focus groups participants revealed different perceptions of the usefulness and effectiveness of the CATME peer-to-peer of rating system on their individual performance and that of their teammates with the group that received ratings and comments to have a much more positive experience than the ratings-only group. The students from both groups overwhelmingly recommended the use of both the ratings and comments in the future.

Limitations of this study relate to the setting and sample. The findings of this study may not be generalizable to other schools because of the unique nature of the project. Additionally, the sample was relatively small and came from just one school of pharmacy. In addition, no psychometric testing was done on the survey instrument used to collect student perceptions of the CATME process. Another limitation is that data was self-reported by students enrolled in a class without blinding. While anonymity and confidentiality was assured, it may have influenced the accuracy of the self-reported data. The lack of blinding could have also impacted the study results. While students were not informed the sections were being handled differently, there was no way to account for the potential discussion about the written feedback amongst the different sections. Future studies with similar focus could address these limitations in order to improve the generalizability of the quantitative data. A larger sample that included students from diverse institutions would improve the generalizability of the quantitative results. Additionally, the dynamics of the team-based project itself may be a confounder in how students viewed the related feedback assignment.

The results of this study are similar to the study published by Popovich[4] where students felt peer assessment helped to better understand individual team performance. Additionally, the results were consistent with the conclusions noted by Van Schaik[5] where students in an interprofessional setting found peer feedback to be useful and positive.

CONCLUSION

This mixed-methods study investigated student perceptions of giving and receiving feedback in a team setting. The results indicate positive student perceptions of receiving written feedback via the CATME system as it relates to performance on a team. Students indicated a more significant and meaningful impact when written comments and ratings were shared with individuals. The findings of this study support the use of an online peer and self-evaluation system for student pharmacists working collaboratively on a group assignment to solve an authentic health-care related problem. The process of giving and receiving written feedback in the team setting in the classroom has the potential to enhance future teamwork in pharmacy practice.

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Table 1: Demographics of Pharmacy Students completing peer assessment survey (n=61)

Demographic Value	Number (%)
Gender	
Male	19 (31.1)
Female	41(67.2)
Prefer not to answer	1 (1.6)
Section	
A	29 (47.5)
B	32 (52.5)
Age	
20 - 24	59 (96.7)
25-30	0 (0)
31-35	2 (3.3)
Residence	
On Campus	23 (37.7)
Off Campus	38 (62.3)
Number of years taking pre-pharmacy courses	
1 year	1 (1.6)
2 years	50 (82.0)
3 years	5 (8.2)
4 years with a degree	5 (8.2)
Job with formal evaluation process	
Yes	42 (68.9)
No	19 (31.1)
Team experience	
Extensive	38 (62.3)
Some	21 (34.4)
None	2 (3.3)
Leadership experience	
Extensive	23 (37.7)
Some	25 (41.0)
None	13 (21.3)

Table 2. Means and Standard Deviations for Online Student Survey for A (comments included) and B (numerical ratings only)

Student pharmacists were asked to rate their agreement to the following statements as Strongly Disagree (SD) = 0, Disagree (D) =1, Neither Agree nor Disagree (N) =3, Agree (A)=3, and Strongly Agree (SA)=4	**A (comments included)**		**B (ratings only)**	
	M	**SD**	**M**	**SD**
When completing the CATME Peer Evaluation, I felt comfortable (at ease) when...				.
a) rating my own performance on the team.	2.62	1.015	2.47	9.50
b) rating the performance of my teammates.	2.90	.860	2.75	1.016
c) providing written comments to my teammates	2.66	1.010	2.34	1.181
d) receiving feedback on my performance from my teammates.	2.93	.842	2.66	1.125
When completing the CATME Peer Evaluation, I felt adequately prepared to				
a) rate the performance of my teammates.	3.14	.743	2.88	.833
b) rate my performance on the team.	3.07	.799	2.84	.808
c) providing written comments to my teammates	3.03	.823	2.65	.950
d) receive feedback on my performance from my teammates.	3.14	.743	2.75	.916
Overall, the team's feedback of my performance was consistent with my self-perceptions of my performance.	3.10	.618	2.84	.723
The feedback helped me to better understand my performance on the team.	**3.14**	**.953**	**2.34**	**1.125**
The feedback helped me to better understand the performance of others on the team.	2.83	.966	2.53	.950
The feedback motivated me to change specific behaviors.	2.76	1.023	2.34	1.035
The feedback I received from the team improved my individual performance.	2.66	1.045	2.41	1.103
The feedback received by the team improved group/team performance.	**2.93**	**.961**	**2.31**	**.965**
This experience has prepared me to provide feedback to others in the future.	**3.07**	**.799**	**2.50**	**.842**
Overall, how did receiving the peer-to-peer feedback impact you and/or your performance? (open response)				
A (comments included) ONLY Describe you experience giving and receiving feedback. How did the written comments from your peers impact you and/or your performance? (open response)				

Abbreviations: S = standard deviation, M = mean

Table 3. Means, Standard Deviations and Significance for CATME Student Perception Survey for A (comments included) and B (numerical ratings only)

	A (comments included)		**B (ratings only)**		
Survey Item	M	SD	M	SD	Significance (*p* value)
The feedback helped me to better understand my performance on the team.	3.14	.953	2.34	1.125	.004[a]
The feedback received by the team improved group/team performance.	2.93	.961	2.31	.965	.015[a]
This experience has prepared me to provide feedback to others in the future.	3.07	.799	2.50	.842	.009[a]

[a]significant at the .05 level
Abbreviation: S = standard deviation, M = mean

Table 4. Student pharmacist perceptions of giving and receiving feedback (presented as a percentage of respondent's level of agreement with survey items) for A (comments included) and B (numerical ratings only)

Student pharmacists were asked to rate their agreement to the following statements as Strongly Disagree (SD), Disagree (D), Neither Agree nor Disagree (N), Agree (A), and Strongly Agree (SA)						
Survey Item	**A (*n*=29) B (*n*=32)**	**% SD**	**%D**	**%N**	**%A**	**% SA**
The feedback helped me to better understand my performance on the team.	A	0	10	7	41	41
	B	6	16	31	31	16
The feedback received by the team improved group/team performance.	A	0	14	7	52	28
	B	3	16	38	34	9
This experience has prepared me to provide feedback to others in the future.	A	0	7	7	28	59
	B	0	16	25	53	6

Table 5. Students' Perception of the Survey

Perception of Survey	
Received peer-to-peer comments	**Did not receive peer-to-peer comments**
Easier to tell your thoughts	I would have been able to use [the comments] to make changes
Excited to see the results	I was indifferent
As soon as I got the email [that the results were available], I had to go to my computer	[Numerical] ratings were an average and not especially helpful
Comments were pretty accurate	Really didn't look at the feedback
Some of the comments were verbatim of what I said about myself	I think if we got the comments I would have been more excited

Table 6. Students' Perceived Influence of the Feedback

Perceived Influence of Feedback	
Received peer-to-peer feedback	**Did not receive peer-to-peer feedback**
I looked for the constructive feedback first	I don't think it did much
I paid more attention to the comments	I felt like it got worse as we went along
I was more aware of what was going on in my group	We could have addressed the issues that were there – and there were definitely issues there
Knew we were being evaluated and it made me more conscious of what I was doing	[If they] saw the comments, maybe they would have stepped it up a little bit
After the feedback there was kind of a dynamic change in the group	Gave some feedback and [a classmate] never took it into consideration. They never saw it!
More conscious of what we, ourselves, were doing	Effectiveness of the group went downhill