Can Peer Assessment Impact Self-efficacy During Small-Group Learning?

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Abstract

Introduction: While studies report positive correlations between students' perceptions of the learning environment and their reported self-efficacy, the role of peer assessment is poorly understood in this context. This study examines the process and impact of peer assessment on self-efficacy and perceptions of the learning environment during a small-group discussion-based course required of first-year medical students.

Methods: After spending time in small-group learning, students completed three peer assessments and reviewed three assessments of themselves. Analysis of the peer assessments included thematic coding of comments and word counts. Prior to and following the assessment period, students completed a survey including the Generalized Self-efficacy (GSE) Scale, and six locally-developed questions regarding the learning environment and perceptions of peer assessment. We performed paired-sample *t* tests to determine whether there were differences between the pre- and post-peer assessment surveys. The SUNY Upstate Institutional Review Board reviewed the study and determined it to be exempt.

Results: Peer assessment narratives referred most commonly to students' participation style and the need for greater participation. Word counts ranged widely. A paired sample *t* test indicated that the difference between pre and post peer assessment GSE scores was significant (*P*=.009), but the effect size was small (*d*=0.32). Perceptions of the learning environment did not change after the peer assessments.

Conclusion: Peer assessment offers a potential strategy for enhancing self-efficacy in medical school small-group learning environments and requires few resources to implement, relative to the potential benefits.

Introduction

Postresidency professional growth is dependent on learning from one's colleagues, yet uncertainty about the quality and impact of peer assessment in higher education has hindered its adoption.[1-3] Medical students may fear consequences of evaluative transparency in peer assessment both for themselves and their community.[4] The learning environment is particularly important; positive learning environments promote the development of self-regulated learning behaviors, skills essential to personal and professional growth.[5] While most studies report positive correlations between students' perceptions of the learning environment and their reported self-

efficacy,[6] the role of peer assessment is poorly understood in this context. This study examines the impact of peer assessment on self-efficacy and perceptions of the learning environment during a small-group, discussion-based course for all first-year medical students (MSIs).

Methods

At SUNY Upstate Medical University, MSIs take a required course in bioethics, public health, and related social sciences. The majority of course content is taught through case-based, small-group discussions. Groups of 10-12 students and two faculty facilitators meet throughout the year to discuss 22 cases.

Pilot and Validity

In 2017-2018, the purpose of peer assessment was shared with MS1s during a required training about the small-group experience, assessment system, and how to provide useful feedback to peers. During the course, all students were required to complete peer assessments using a form similar to the one used by faculty. Students were informed that the content of peer assessments would not impact grading, but would be reviewed for noncompletion and that the inclusion of unprofessional remarks would lead to an incomplete in the course and/or a professionalism concern report. Analysis of the assessment data and student responses established that the process and tool had face validity. The peer assessment tool is available on the STFM Resource Library.

Study

In 2018-2019, with the same training and policies in place, students completed three peer assessments after 9 hours of small-group discussion. In the weeks prior to and following the assessments, students were invited to complete surveys including the previously validated Generalized Self-Efficacy Scale[7] (10 items with four response options each: not at all true, hardly true, moderately true, and exactly true, summed for a total score ranging from 10 to 40), as well as six locally-developed questions regarding the learning environment and perceptions of the peer assessment (see Figure 1 for a process flow chart).

Peer assessment comments were thematically coded by two researchers using constant comparative analysis.[8] The average number of words students wrote in response to each of the three questions about their peers was calculated. An analysis using G*Power confirmed that the sample size (N=71) would be adequately sensitive to effects of Cohen's d=0.5, with 0.95 power (α=.05, two-tailed).[9] We performed paired-sample t tests in IBM SPSS, Version 27, to determine whether there were differences between the pre- and post-peer assessment surveys. The SUNY Upstate Institutional Review Board deemed the study exempt.

Results

Students wrote an average of 19.52 words per peer when asked to describe their peer's strengths; 12.82 when asked to describe weaknesses; and 13.42 when asked about areas for improvement (Table 1). The most common strengths and recommendations for growth both related to participation. Participation style and frequency were cited as strengths in 85.2% of comments, while learner-specific versions of "participate more" (linked to a compliment or a specific statement about the student) were cited in 29.8% of the recommendations for "reaching the next level of performance." Table 1 includes comment themes, frequencies, and examples.

Of the 168 students who completed peer assessments, 71 (42.2%) completed both pre- and postsurveys (Table 2). The preassessment mean on the Generalized Self-Efficacy Scale was 32.07 (SD 4.03) with a median of 33 (IQR 30-35); the postmean was 33.00 (SD 4.15) with a median of 33 (IQR 30-36). A paired-sample t test indicated that the difference was significant (P=.009), but the effect size, determined by Cohen's measure, was

small (d=0.32).[4]

Perceptions of the learning environment did not change after the peer assessments (Table 3), however there was a statistically significant decline in positive responses to the item, "I think that giving feedback to my peers will help me learn to give good feedback later on in my career" (P=.041), though the effect size was small (d=.22).

Discussion

While students did not find the experience of completing assessments of their peers optimally useful to their development as assessors, after reviewing the feedback given to them by peers, the overall self-efficacy of the cohort increased. Any increase in students' self-efficacy, especially after a small-scale intervention, suggests that the process may have benefits beyond the aim of enhancing performance.

We hypothesize that the process of assessing others was not fully useful because students did not receive feedback on the quality of their assessments. Course faculty only reviewed assessments to assure that students made a meaningful effort and demonstrated professionalism in their narrative comments. To date, most studies of peer assessment have not addressed how educators review peer assessment quality or remediate students who do not provide effective feedback[10] and we recommend this for further study.

Although the study took place within a single course and institution and the effect sizes were small, these findings suggest a role for peer assessment, in spite of its previously-recognized limitations. This work has implications for the continued study of peer assessment in health professions education and lays the groundwork for larger-scale studies, comparing students across programs and institutions.

Conclusion

Peer assessment offers a potential strategy for enhancing student self-efficacy within the medical school environment that requires few resources to implement, relative to the potential benefits. Our findings support the need for further research with larger sample sizes, linked GSE and assessment results, multiple institutions, and students at other stages of training; for work utilizing measures of constructs beyond generalized self-efficacy and more sensitive measures of the learning environment; and for qualitative studies to better understand how students integrate peer feedback into their developing professional identities.

Tables and Figures

Figure 1: Project Process Flow Chart

[First 2 months of academic year]   [3 week period in October/November]

Training
[Purpose of peer assessment, assessment tools, assessment system, how to provide useful feedback]

→

9 hours of small group sessions

→

Pre-survey
[Generalized Self-Efficacy; 6 locally developed questions regarding the learning environment]

→

Assessment of 3 peers

→

Read and reflect upon feedback from peers collected in the assessment process

→

Post survey
[Generalized Self-Efficacy; 6 locally developed questions regarding the learning environment]

→

Attend next small group session

Administration of post survey and the next small group session co-occurred shortly after student's were given access to peer feedback.
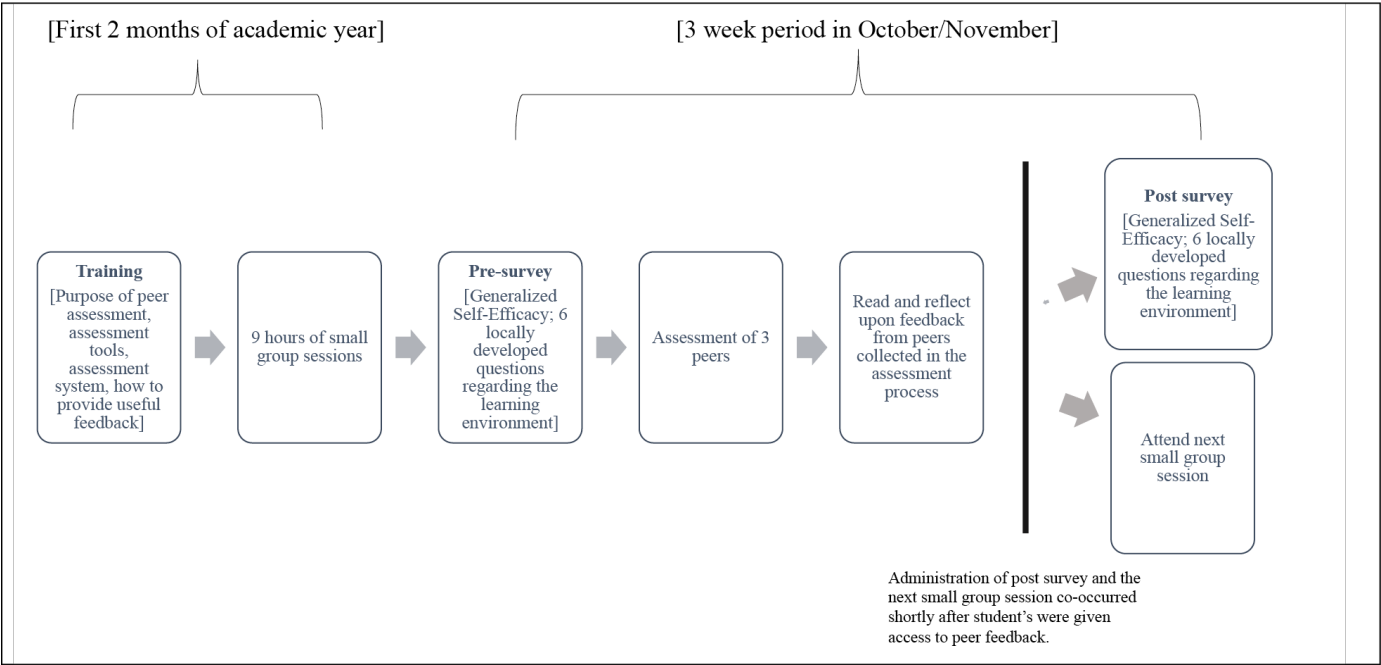
Table 1: Themes, Frequencies, and Sample Comments From Student Responses to Open-Ended Peer-Assessment Questions

Student Responses to, "What are the student's strengths?" (500 Comments, Average Words/Peer=19.52, SD=3.4, Range: 6-81)			
Theme*	**# of All References**	**% of All References**	**Sample Comments and Subthemes**
Participation	426	85.20%	**Reference to participation style (76.8%):** "[First name] consistently participates in class. He asks questions to gain clarification and provides information outside of his assigned question;" "Always has relevant contributions to discussions which are fortified by personal experiences"
			Reference to participation frequency (16.8%): "...*Always* respectfully contributes to conversation…" "*consistently*…" (see above) [emphasis added]
Preparation (overall)	157	31.40%	**Prepared overall (31.4%):** "… clearly comes prepared…" "[First name] always comes prepared and appears to have thought about the topic a lot and considered different aspects of it."
			Prepared for preassigned questions (17%): "...Answering assigned questions thoroughly, plus being able to answer on-the-fly questions from her research;" "The question that they are responsible for is answered well."
Personal characteristic	76	15.20%	"Very *upbeat* and *easy to talk to*. Willingness to share opinions. *Creates a comfortable environment for everyone.*" "I think that [first name] is a very *empathetic* person and can always offer a *sensitive, insightful opinion* about a given ethical issue." [emphasis added]
Respectful	33	6.60%	"... is respectful of others talking." "...Respectfully joins discussion…"
Special point of view (specific training or background)	16	3.20%	"She brings in personal stories (especially with *the interpreter issue in the office*) with her own experiences which adds depth to the conversation." "[First name] has *a strong background in public health* which helps him understand the class concepts in a bigger picture." "...She contributed to the conversation *based on her own personal experience of being a mom*, and I felt like that helped the group get a different perspective..." [emphasis added]
Student Responses to, "What are the student's weaknesses?" (500 Comments, Average Words/Peer=12.82, SD=12.4, Range: 1-73)			
Theme	**# of References**	**% of All References**	**Sample Comments**
"Participate more"	186	37.20%	"Could participate more in the discussion and ask more questions;" "She can have more active participation."
N/A or None	149	29.80%	"N/a;" "None;" "None that I can tell;" "Nothing readily comes to mind"
Other (specific to student)	90	18.00%	"Not very punctual;" "Very quiet at the start of her sentences progressing to too loud by the end of her sentences. It's a small point but she does a lot right;"
Not fully considerate of other students	43	8.60%	"He participates a lot which is great but he may want to give some others a chance to participate;" "Addresses instructors more often than other students at times"
Direct reference to assessment criteria	32	6.40%	"Needs to draw more on knowledge from other sources such as prior sessions and other courses;" "He can answer 'what' questions easily and should start working on being able to answer 'why' questions involving ethical principles."

Table 1: Continued

			What is one concrete thing this student could do to reach the next level of performance? (500 Comments, Average Words/Peer=13.42, SD=9.9, Range: 1-73)
Theme	**# of References**	**% of All References**	**Sample Comments and Subthemes**
"Participate more"	236	47.20%	**Participate more (17.4%):** "Talk more;" "Participate more in discussions;" "More participation" **Ask questions (10%):** "ask more questions;" "He can begin to present forth more questions and ask more about the cases at hand. Instead of answering questions ask more to steer the conversation" **Includes a compliment (5.4%):** "participate more...you have good insights!" "You are doing a great job! Your input is always good to hear about! If i was forced to say one thing, it would be to speak some more because you always bring good ideas into the conversation." **Specific to student (14.4%):** "Play 'devil's advocate' when expressing ideas. Instead of stating her point of view, she could explain the other side of the argument;" "He could do a better job at offering and responding to counterarguments"
Direct reference to assessment criteria	113	22.60%	"From the criteria: apply more public health concepts;" "He could bring up relevant ethical principles or public health concepts and apply them to the topic of discussion."
Don't change	58	11.60%	"Keep it up! Your thoughts and behavior are very good in class;" "The student should continue to bring their unique perspective to the class discussions and take into accounts different perspectives to continue to broaden their viewpoints."
Other	57	11.40%	"Confidence in her input;" "Less rehearsed responses to questions, he could have more "natural" discussions"
N/A or None	24	4.80%	"N/A;" "None!"
Make space for others	12	2.40%	"While [First name's] participation is admirable, I think if she was to participate a little less, this would allow her to learn more about other perspectives when talking about an argument;" "Could allow other people in group to complete their thought before adding to it."

*In some cases, one student's comments reflected multiple themes so the sum of the percent column is >100%.

Table 2: Results and Paired *t* Test Comparisons for Generalized Self-efficacy Items and Scale (n=71)

Item	Pretest		Posttest		Paired *t* test	
	Mean	SD	Mean	SD	Mean of Diff. (CI)	*P* Value
I can always manage to solve difficult problems if I try hard enough.	3.20	0.60	3.37	0.54		
If someone opposes me, I can find the means and ways to get what I want.	2.48	0.63	2.85	0.62		
I am certain that I can accomplish my goals.	3.42	0.60	3.42	0.55		
I am confident that I could deal efficiently with unexpected events.	3.31	0.62	3.32	0.58		
Thanks to my resourcefulness, I can handle unforeseen situations.	3.23	0.61	3.35	0.64		
I can solve most problems if I invest the necessary effort.	3.56	0.58	3.46	0.61		
I can remain calm when facing difficulties because I can rely on my coping abilities.	3.28	0.66	3.35	0.54		
When I am confronted with a problem, I can usually find several solutions.	3.21	0.61	3.27	0.61		
If I am in trouble, I can think of a good solution.	3.21	0.58	3.27	0.51		
I can usually handle whatever comes my way	3.17	0.56	3.34	0.53		
Total GSE Score	32.07	4.03	33.00	4.15	0.93 (0.24, 1.62)	.009

Abbreviation: GSE, Generalized Self-efficacy Scale

Table 3: Results and Paired *t* Test Comparisons for Learning Environment and Assignment Feedback Items

Item	Pre		Post		Paired *t* Test	
	Mean	SD	Mean	SD	*P*	Cohen's *d*
Learning Environment						
I am satisfied with my experience in small group.	3.32	0.60	3.31	0.60	.84	-
The learning environment in my small group is generally positive.	3.63	0.51	3.59	0.58	.50	-
I am building good relationships with my peers.	3.13	0.65	3.27	0.63	.09	-
Assignment Feedback						
The feedback I received from my peers will help me participate more effectively in small group discussions.	2.85	0.87	2.85	0.87	1.0	-
The feedback I gave to my peers will help them participate more effectively in small group discussions.	2.75	0.86	2.89	0.80	.16	-
I think giving feedback to my peers will help me learn to give good feedback later on in my career.	3.21	0.81	3.03	0.83	.04*	0.22 (small)

*Correlation is significant at the .05 level (2-tailed).

Acknowledgments

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