

RESEARCH ARTICLES

Peer- and Self-Grading Compared to Faculty Grading

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Objectives. To determine the reliability and value of peer- and self-reported evaluations in the grading of pharmacy students.

Methods. Mean student peer- and self-reported grades were compared to faculty grades in the advanced pharmacy practice experience (APPE) and seminar presentation courses. Responses from pharmacy school alumni regarding curricular peer- and self-reported evaluations were solicited using an online survey tool.

Results. Self-reported student grades were lower than the faculty-reported grade overall and for the formal presentation component of the APPE course grading rubric. Self-reported grades were no different than faculty-reported grades for the seminar course. Students graded their peers higher than did faculty members for both the seminar and APPE courses on all components of the grading rubric. The majority of pharmacy alumni conducted peer- and self-evaluations (64% and 85%, respectively) at least annually and considered peer- and self-evaluations useful in assessing students' work in group projects, oral presentations, and professional skills.

Conclusion. The combination of self-, peer-, and faculty-assessments using a detailed grading rubric offers an opportunity to meet accreditation standards and better prepare pharmacy students for their professional careers.

Keywords: self-assessment, peer-assessment, grading rubric, evaluation, assessment, advanced pharmacy practice experience

INTRODUCTION

Performance assessments provided by supervisors or peers in conjunction with self-evaluations are an integral part of a pharmacist's professional development. Self-reflection is an essential part of this process, as it provides insight about how people view themselves and their behaviors relative to peers and supervisors. It also reveals self-assessed strengths and weaknesses, identifies the barriers that must be overcome to surmount limitations, and expresses future opportunities for growth.¹⁻³ Likewise, peer reflection demonstrates strong or poor performance relative to someone on the same level.⁴ Formal self-assessments in pharmacy school curricula, which is mandated by the Accreditation Council of Pharmacy Education, provides consistent and reliable assessments among faculty members and preceptors.⁵ Pharmacy educators are in a position to provide consistent and high-quality feedback so that students are able to develop more accurate self-assessments as part of their

pharmacy education.⁶ Previous studies report inconsistent results regarding the value of self-grading and there are a limited number of reports about peer-grading. There are no reports regarding pharmacy alumni perspectives on the value of peer and self-assessment as part of the pharmacy curricula. The objective of the study was to evaluate the reliability and value of peer- and self-reported student evaluations in the grading of pharmacy students by assessing the differences in peer, self, and faculty grades in 2 courses offered at the Ernest Mario School of Pharmacy at Rutgers University.

METHODS

The reliability of peer- and self-evaluations were assessed by measuring the differences in grades assigned to students in faculty evaluations, student-peer evaluations, and self-evaluations for seminar presentation and advanced pharmacy practice experience (APPE) courses. The course objectives and study procedures were reviewed with faculty members and students at the beginning of each semester during the seminar presentations course and reinforced by the individual student's preassigned faculty mentor during each of the 5-week APPEs. Students were told that the self- and peer-evaluations would not be included in

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their grades and that faculty members would not see the peer- and self-evaluations prior to assigning student grades. Thus, both faculty members and students would be blinded until evaluations were completed.

The value of including peer- and self-evaluations in the school curriculum was evaluated by surveying alumni of Ernest Mario School of Pharmacy (EMSOP) about perceived and real benefits of self- and peer-evaluations in current professional practice and in the pharmacy school curriculum.

Seminar Presentation Course

Students in their sixth year at EMSOP were required to take a 2-credit seminar presentation course during the fall and spring semesters to promote student public presentation skills. The class met weekly and was structured as formal student presentations to faculty members and student peers. The class was divided into 3 groups meeting in 3 different classrooms. Each group consisted of 3 student presenters, 3 faculty members, and 30% of the peer students. Each student was required to give a 20-minute presentation on a current pharmacy-oriented topic, followed by a 10-minute question-and-answer period. Each presenter was evaluated by 3 faculty members, themselves, and all student peers. Subsequently, each student met privately with 1 of the 3 faculty members to discuss the faculty-, self-, and peer-assigned grades. Students were able to request a copy of the evaluation forms prior to submission to the investigator.

The students were evaluated using a 20-item form, which assessed 4 components of the student's presentation (content, presentation style, audio-visual aids, and handout) on an ordinal rating scale ranging from 1 (unacceptable) to 5 (optimal). Evaluators also were asked to assign an overall grade, ranging from A to F based on the score out of 100 possible points.

Advanced Pharmacy Practice Experience Course

The 1-year grading period included 9 APPEs in various inpatient and outpatient settings, each 5 weeks in duration. The course objectives and performance grading criteria were reviewed by faculty members and students at the beginning of each APPE. During each APPE, the students were evaluated using a 19-item grading rubric designed to assess 5 components of each student's performance: general objectives/professional performance, general knowledge, clinical skills, communication skills, and formal presentations. Each item was rated on a 5-point categorical scale (O = outstanding, far exceeds expectations; A = above average, exceeds expectations; S = satisfactory, meets expectations; I = needs improvement; and N = not able to evaluate). When completing the form, all evaluators assigned an overall letter grade (A, B+, B, C+, C, or F) based on the above ratings.

At the end of each APPE, students evaluated their own performance and the performance of their peers using the APPE grading rubric. All forms were filled out independently and collected by a faculty member. The faculty member and the student to be evaluated then met privately to discuss the faculty-assigned grade and how that grade compared with the self- and peer-assigned grades. Faculty members were not required to share peer-evaluations, depending on what they felt was appropriate. This process was repeated for each student. All students received a copy of their individual evaluations, and the original documents were given to the investigator. Each form was coded for the peer, faculty member, and student involved in the grading process. The blinded data were then recorded on an Excel spreadsheet by a paid data-entry employee.

Online Alumni Survey

The second phase of the study was conducted using an online survey tool, SurveyMonkey.com (SurveyMonkey, Palo Alto, California). EMSOP alumni were surveyed to determine whether peer- and self-evaluations were part of their current professional practice and whether adding training in this area would improve the pharmacy curriculum. An e-mail containing a link to the survey instrument was sent to EMSOP program graduates, who were allowed 2 weeks to complete it.

The survey instrument included 7 questions and was estimated to take 10 minutes to complete. Several questions contained response subsections based on a 5-point Likert rating scale on which 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The remaining survey questions were open-ended, requiring respondents to type out a short response.

The investigator performing the analyses was blinded to the identity of the students and faculty members. The rating scale on the APPE grading rubric was converted to corresponding letter grades and then to numeric equivalents (O = A or 4.0; any combination of O/A = B+ or 3.8; A = B or 3.0; any combination of A/S = C+ or 2.8; S = C or 2.0; any combination of S/I = D or 1.8; and I = F or 1). For the seminar course grading rubric, letter grades were converted to numeric equivalents: A = 4.0, B+ = 3.5, B = 3.0, C+ = 2.5, C = 2.0, and F = 1.0. For the purposes of this study, 5 of the peer-evaluations were randomly selected from the peer-evaluations for each student. Each form was coded for the student, peer, and faculty members involved in the grading process. The blinded data were then recorded in an Excel spreadsheet by a paid data-entry employee.

Cross-sectional and longitudinal data analyses were conducted using SAS Analytical Software (SAS Institute Inc, Cary NC). Means with standard deviations were

calculated for the 4 components assessed in the seminar grades and the 5 components assessed in the clerkship grades. Repeated-measurement analysis of variances and one-way analysis of variances were conducted to test for differences in means across the evaluators for the clerkship grades and the seminar grades, respectively.⁷⁻⁹ For the component that showed significance in that test, Bonferroni *t* tests were used to compare pair-wise mean differences between evaluators (ie, faculty vs. peer, faculty vs. self, and peer vs. self).⁷⁻⁹

The Cronbach alpha statistic was used to measure consistency among each of the subsections within the APPE grading rubric (Cronbach alpha was 0.89 for general APPE objectives/professional performance, 0.87 for assessment of general knowledge, and 0.93 for clinical skills) and for subsections within the seminar grading rubric (Cronbach alpha was 0.90 for content and 0.76 for presentation style). Internal consistency, however, was not tested for components with only 2 items: communication skills and formal presentations in the clerkship grades; and audio-visual aids and handouts in the seminar grades. Selection of evaluation items was determined based on Cronbach alpha greater than 0.7 for a component.^{10,11}

The data from the survey were downloaded from SurveyMonkey.com and analyzed descriptively using Microsoft Excel.

RESULTS

Two hundred thirty-four students and 31 faculty members participated in the 1-year grading project for the seminar and APPE courses. The majority of students were either Asian (43.2%) or white (38.9%), and there were more female than male student participants (68.1% and 31.9%, respectively). Of the 31 participating faculty members, 22 were full-time and 9 were adjunct, and most were white and female (90.3% and 61.3%, respectively). Thus, the faculty members and students were about equal with respect to ratio of gender, but the percent of Asian faculty members was less than that in the cohort student ratio. The mean duration of faculty member teaching experience at the time of the study was 5.3 ± 3.3 years. The mean grade point average (GPA) of the students was 3.1 ± 0.4 for undergraduate courses and 3.4 ± 0.4 for graduate level courses.

The faculty members assigned 217 seminar grades. The mean final seminar grades from peer evaluators (3.8 ± 0.2) were significantly higher than those assigned by both faculty members (3.7 ± 0.4) and student self-assessors (3.7 ± 0.5) ($P < 0.001$) (Table 1). Student-peers consistently graded higher on all 4 evaluation form components (content, presentation style, audio-visual aids,

and handout). Student self-evaluations were not significantly different from faculty assessments for the final grade or for any of the 4 components of the evaluation form. The faculty members assigned 176 APPE grades. Peer-evaluators graded student overall performance higher (3.9 ± 0.2) than did faculty evaluators (3.8 ± 0.3) and self-evaluators (3.7 ± 0.3) (Table 2). The differences in overall final APPE grades were significant among peer, self, and faculty evaluations ($P < 0.001$). Peer-evaluator grades for all 5 components (general objective/professional performance, assessment of general knowledge, clinical skills, communication skills, and formal presentations) were significantly higher than faculty-assigned grades. Students graded themselves lower overall and for formal presentations than did faculty members, but the differences between self-assessed and faculty-assigned grades were not significant for the other components of the evaluation form. Of the 2,357 EMSOP alumni contacted by means of e-mail, 107 (4.5%) responded within the 2-week period. Most respondents (80.4%) had not performed peer- or self-evaluations while attending the EMSOP program. However, in their current professional practice, 64% of the respondents indicated using peer evaluations at least once each year and, 85% performing a self-evaluation at least annually. Of the 19.6% of respondents who had participated in peer- and/or self-grading during pharmacy school, the majority (76%) thought it was a helpful experience.

Most respondents agreed that peer- and self-evaluations should be used for group projects and oral presentations in didactic courses and clerkships at colleges and schools of pharmacy (Table 3). They also agreed that peer- and self-evaluations should be used to assess students' general knowledge as well as their interactions with patients or medical team members in APPEs. Most respondents felt that peer- and self- assessment should not be part of the overall grade for clerkships or seminars. A large number of respondents (14% to 30%) remained neutral about peer- and self-grading.

DISCUSSION

In this study, the use of peer- and self-evaluations in seminar and APPE courses offered insight into the grading trends of students compared with those of faculty members and preceptors. Students tended to grade their peers more generously while grading themselves the same as faculty members on the evaluation form components but lower than faculty members for their overall grade. Even though the differences among peer, self, and faculty grades in this study were significant, they may not be academically significant because differences of 0.1 to 0.4 were unlikely to result in a student receiving a different

Table 1. Comparison of Overall and Component Seminar Grades for Pharmacy Students Assigned by Faculty Members, Student Peers, and the Students

	Evaluator		
	Faculty (n = 217)	Peer (n = 215)	Self (n = 199)
Overall seminar grade ^{a,b}			
Mean (SD)	3.7 (0.4)	3.8 (0.2)	3.7 (0.5)
Mean difference (SD) vs. faculty	–	-0.1 (0.4) ^c	0.02 (0.6)
Mean difference (SD) vs. peer	–	–	0.1 (0.5) ^c
Content component ^d			
Mean (SD)	4.5 (0.4)	4.7 (0.3)	4.6 (0.4)
Mean difference (SD) vs. faculty	–	-0.2 (0.4) ^c	-0.1 (0.5)
Mean difference (SD) vs. peer	–	–	0.1 (0.4) ^c
Presentation style component ^d			
Mean (SD)	4.4 (0.4)	4.6 (0.3)	4.3 (0.6)
Mean difference (SD) vs. faculty	–	-0.2 (0.4) ^c	0.1 (0.6)
Mean difference (SD) vs. peer	–	–	0.3 (0.6) ^c
Audio-visual aids component ^{d,e}			
Mean (SD)	4.5 (0.5)	4.7 (0.3)	4.6 (0.6)
Mean difference (SD) vs. faculty	–	-0.2 (0.5) ^c	-0.1 (0.7)
Mean difference (SD) vs. peer	–	–	0.2 (0.6) ^c
Handout component ^{d,e}			
Mean (SD)	4.6 (0.4)	4.8 (0.3)	4.6 (0.5)
Mean difference (SD) vs. faculty	–	-0.2 (0.4) ^c	-0.04 (0.7)
Mean difference (SD) vs. peer	–	–	0.2 (0.5) ^c

^a Evaluator-assigned overall final grade (4 = A, 3 = B, 2 = C, 1 = D, 0 = F).

^b Only 189 students submitted self-assessments.

^c P < 0.001

^d Ordinal rating scale on evaluation form ranging from 1 = unacceptable to 5 = optimal.

^e Only 197 students submitted self-assessments.

letter grade (Tables 1 and 2). As students receive additional training and gain experience, these differences may diminish, especially considering that most of the students in the study likely had little prior experience in peer and self-grading.

With respect to seminar and APPE grades, peer evaluators tended to be more generous in assigning high grades than faculty members and self-evaluators. These findings suggest that peer grading may be less useful in overall seminar and APPE grading because it may falsely inflate the true academic merit of a student's performance. The tendency toward leniency with peers may result from students assessing their peers' effort rather than their performance⁴ or not wanting to offend their classmates. Additionally, because students spend more time together, they may have an opportunity to observe a different set of skills in their peers than do faculty members. Despite concerns students may have about incorporating peer assessments into their grades, written feedback or critiques by peers may be useful to students based on studies showing that peer-assessment is valued and accepted by students and residents.⁴ Peers also can provide

useful comments regarding content and suggestions for future improvement and comment on other students' contributions to group projects. It is difficult to measure the true difference between faculty members and student grading when the students know that their evaluation will not have an impact on their final grades. More education is needed to help students learn how to evaluate their peers before including peer evaluations other than comments in final grades.

Agreement between self- and faculty assessments demonstrates students' ability to successfully recognize their own strengths and weaknesses. One study suggests that self-assessment may actually be more consistent than perceived, because the self-assessment grades did not change much from the pilot study to the follow-up study, whereas faculty and peer grades decreased over that same timeframe.⁴ This is supported by Fjortoft who suggested that self-assessment skills develop early in life and remain stable thereafter.⁶ However, the self-assessment process should be validated, students should receive adequate training on how to use these instruments, and students should be allowed to practice self-assessment frequently.

Table 2. Overall and Component Advanced Pharmacy Practice Experience Course Grades

	Evaluator		
	Faculty (n = 161)	Peer (n = 156)	Self (n = 157)
Overall clerkship grade ^a			
Mean (SD)	3.8 (0.3)	3.9 (0.2)	3.7 (0.3)
Mean difference (SD) vs. faculty	–	-0.1 (0.2) ^b	0.1 (0.3) ^c
General clerkship objective/professional performance component			
Mean (SD)	3.1 (0.5)	3.4 (0.4)	3.1 (0.5)
Mean difference (SD) vs. faculty	–	-0.3 (0.5) ^b	-0.03 (0.6)
Mean difference (SD) vs. peer	–	–	0.3 (0.7) ^b
Assessment of general knowledge component			
Mean (SD)	2.9 (0.6)	3.2 (0.5)	2.8 (0.6)
Mean difference (SD) vs. faculty	–	-0.4 (0.5) ^b	0.1 (0.6)
Mean difference (SD) vs. peer	–	–	0.4 (0.6) ^b
Clinical skills component			
Mean (SD)	2.9 (0.6)	3.2 (0.5)	2.8 (0.6)
Mean difference (SD) vs. faculty	–	-0.3 (0.6) ^b	0.1 (0.7)
Mean difference (SD) vs. peer	–	–	0.4 (0.7) ^b
Communication skills component ^d			
Mean (SD)	3.2 (0.6)	3.4 (0.5)	3.1 (0.6)
Mean difference (SD) vs. faculty	–	-0.2 (0.6) ^b	0.1 (0.8)
Mean Difference (SD) vs. peer	–	–	0.3 (0.7) ^b
Formal presentations component ^e			
Mean (SD)	3.1 (0.6)	3.4 (0.5)	3.0 (0.7)
Mean difference (SD) vs. faculty	–	-0.3 (0.6) ^b	0.25 (0.8) ^c
Mean difference (SD) vs. peer	–	–	0.4 (0.7) ^b

^a Several faculty members used their own grading form; therefore, only final overall grades were used in the analysis. Some students completed the grading rubric but did not provide an overall clerkship grade. Thus, overall grades were submitted by 176 faculty evaluators, 155 peer evaluators, and 149 self-evaluators.

^b $P < 0.001$

^c $P < 0.05$

^d Only 155 students submitted peer-assessments.

^e Only 154 students submitted peer-assessments.

A student's self-assessment can be validated by videotaping interactions with peers, faculty members, patients, and various hospital staff members in a range of skill-based assignments, such as patient interviews, physical examinations, and educational presentations. After reviewing the video, the student may be better able to perform self-assessments.

Self-assessment is believed to be an important life-long skill. There could be dangerous consequences for practitioners with flawed self-assessment skills, especially if they overestimate their own abilities. This is an issue warranting concern based on study findings that pharmacy students are not accurate self-graders.^{1,13} Quality of self-assessment may be influenced by a student's academic ability, as students who are in the lowest GPA quartiles tend to overestimate their skills while those in higher quartiles are more likely to underestimate them.^{1,14} Possible explanations for the small differences between faculty and student grading in the

current study may be that most of the participating students had a high GPA (3.4 of possible 4.0), and 4 of the 31 faculty members gave all their students during the study year a 4.0, which may have increased the mean faculty GPA.

Student portfolios are not adequate for self-assessment because they usually are an unguided personal reflection of a student's practice experience that neither provides enough information to improve student performance¹³ nor validates the student's ability to self-assess. While portfolios are tools students can use to analyze their experiences, they usually cannot confirm a student's self-perception of professional development. Adding peer- and self-evaluations of performance throughout the curriculum may enhance students' overall experience and improve their self-assessment skills.

One study noted that pharmacy students were more likely to overestimate their professional skills than their drug knowledge during APPEs.¹⁵ It is probably more

Table 3. Alumni Responses Concerning Perceived Need for Peer- and Self-Evaluations in Grading at the Ernest Mario School of Pharmacy

	N	% Agree and Strongly Agree	% Neutral	% Disagree and Strongly Disagree
Peer evaluations should be used for group projects	106	74	14	12
Peer evaluations should be used for oral presentations	106	66	19	15
Peer evaluations should be used to evaluate the student's interactions with patients or medical team	106	65	17	18
Peer evaluations of a student's general knowledge	105	39	29	32
Peer evaluations should be used for overall grade	106	34	26	40
Self-evaluations should be used for group projects	106	60	26	14
Self-evaluations should be used for oral presentations	106	63	21	16
Self-evaluations should be used to evaluate one's own interactions with patients or medical team	106	69	19	12
Self-evaluations of own general knowledge	106	50	30	20
Self-evaluations should be used for overall grade	103	29	30	41

The response score was based on a 5-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree). The number of responses in each category was tabulated.

difficult to assess skills versus knowledge because skill assessment includes subjective evaluations. Students' assessment of their own professional skills also may be influenced by their previous performance in didactic classes, which measure knowledge. Thus, self-assessment may be improved by creating better evaluation tools and spending more time teaching students how to use them. Several studies indicated that using video recordings as an assessment tool improved students' self-confidence, interviewing, and self-assessment skills.^{13,14,16} As in our study, using a detailed rubric-based evaluation form that includes assessment of professional behavior, performance on various skills, and knowledge also may facilitate the process.⁴

Limitations of the study include that it was confined to only 1 academic year and there was a low response to the alumni survey. In assigning a grade for a student's seminar, the evaluating faculty member could be influenced by the other 2 faculty members in the room, based on tone or type of questions asked of the student. Additionally, studies evaluating student self- and peer-assessments assume that the faculty evaluation of the student is most accurate, which may not be true in some cases. Grading differences between student and faculty members may be difficult to ascertain correctly if faculty members are inconsistent or inexperienced graders. For reasons related to confidentiality and the study's short duration, the faculty grading profile could not be evaluated in this study. However, pharmacy administrators could use peer- and self-evaluations of students to help compare grading trends between faculty members and adjunct faculty preceptors. This information could be helpful in faculty or preceptor development designed to

improve grading skills and may be a valuable addition to student evaluations of faculty members and preceptors. Improving the grading skills of faculty members may, in turn, help students become better peer- and self-evaluators.

CONCLUSION

Because the majority of pharmacists are expected to perform peer- and self-evaluations in the workplace, we propose that pharmacy schools expand the evaluation process to include these types of assessments. Current problems in the validity of peer- and self-evaluations call for curricular changes to better train students to meet these expectations after graduation. While it is not necessary to incorporate peer- or self-evaluations into a student's final grade, feedback from peers and self is valuable. If given at the end of each APPE, feedback can be used to improve knowledge and/or skills before moving on to the next APPE. This process encourages students to be accountable for their learning and progression throughout their pharmacy education. The faculty member/preceptor should use discretion when using student-peer evaluations and avoid inappropriate disclosure of peer comments to the student. It is the preceptor's responsibility to find validity in peer comments and mix that feedback with his/her own to ensure that peer feedback remains anonymous. If used correctly, the combination of self-, peer-, and faculty assessments can provide an opportunity for pharmacy students to grow and develop and become better prepared to meet the evaluation requirements of future employers.

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