A Group Interaction Peer/Self Assessment Process in a Pharmacy Practice Course

Jane E. Krause and Nicholas G. Popovich
School of Pharmacy and Pharmacal Sciences, Purdue University, W. Lafayette, IN 47907-1335

INTRODUCTION

To date, instructor, peer, and self assessments of student performance abilities within post secondary education have been used primarily in liberal arts course work. Traditionally, student grades are based only on instructor assessment through examinations, homework, and adherence to course policies, with little weight given to peer and/or self assessments. Falchikov pointed out that the traditional instructor grading system leads to student preoccupation with receiving a good grade at the expense of other learning activity that does not lead to that desired goal(1). Thus, the instructor grading system, through its emphasis on external rewards and punishments, generates the wrong type of student learning motivation. Instructor assessment tied directly to grading tends to breed student conformity and works against development of personal and interpersonal abilities in students. Traditional instructor assessment practices alone clearly do not promote increased student responsibility and autonomy in their learning habits(1).

Boud stated that traditional assessment practices are lagging behind other positive, innovative changes that are occurring in higher education course work(2). A variety of assessment strategies should be developed to complement the educational innovations that are occurring and to ensure that the innovations are not undermined by unsuitable assessment practices. Similarly, Heron suggested that although the goal of education should be to produce an individual who is able to assess and monitor his/her own progress, the traditional form of assessment does not encourage this(3). Peer assessment, however, can be a very important component of the performance assessment process. Students have an opportunity to observe their peers throughout the learning process and often have a more detailed insight and knowledge of the work of others than do their instructors(4). As a result, peer and self assessments of specific types of student performance have recently been incorporated into some academic courses as a component of grade determination.

Murphy and Torrance suggested that traditional instructor assessment has been concerned more with summative processes than with formative ones, even though on an educational basis, formative processes are the more important and beneficial forms of assessment(5). According to Somervell, peer and self assessment should be a component of a process of change integral to a student-centered educational approach(4). This change requires a paradigm shift in emphasis from the purely summative to a combination of formative and summative assessment, and from the assessment of product alone to the assessment of process as well. Peer assessment can be a component of formative assessment for its value in helping students develop their own habits of reflection and initiative to improve.

The post secondary education literature demonstrates that currently the concept of peer assessment is most prevalent in English and communication course work, where it has been used to critique the work (i.e., speech, essay, homework assignment) of another student. For example, in a college writing course which utilized peer assessment, Hvitfeldt reported that “if students are given very specific guidelines to follow, they often do a credible job of analyzing the strengths and weaknesses in the writing of their peers”(6). In this study, the majority of the students reported that “doing” and “receiving” peer critique was helpful. Similarly, in a communications course, Weaver and Cotrell showed that peer assessment can be “controlled and precise”(6). They concluded that peer assessment emphasizes skills, encourages student involvement, focuses on learning, establishes a frame of reference, promotes excellence, provides

1Presented in part during the poster session, 141st Annual American Pharmaceutical Association Meeting, March 20, 1994, Seattle, WA.
increased feedback, fosters attendance, and teaches responsibility.

Falchikov reported on a psychology course that included peer assessment (1). In this study, self and peer assessment were perceived to be beneficial to the student. The results from a post-course questionnaire administered to the students showed that the process of self and peer assessment made the students think more, learn more, and become more critical and structured in their assessments. In addition, the students found the process to be challenging, helpful, and beneficial, in spite of it being hard and time consuming. This study helped to demonstrate that self and peer assessment increased student responsibility and autonomy, and allowed for the development of both personal and interpersonal abilities. The majority of the studies reported in the literature included peer assessment as a contribution to the student’s final course grade.

The goal of this project was to adapt peer assessment, which has been successful in other curricula, to a Pharmacy Practice course. This is consistent with the current emphasis in pharmaceutical education on student development of general ability-based outcome goals as put forth by the American Association of Colleges of Pharmacy Commission to Implement Change in Pharmaceutical Education(7). Peer assessment in small group work which provides for feedback to the student helps the student understand, learn, and develop abilities in interpersonal and group work effectiveness, in communication strategies (i.e., speaking and listening), and in performance assessment. Peer assessment in small group work is appropriate because the instructor frequently may not have the same degree of intimate contact with the group work process to make such a subjective and qualitative judgment3.

In his 1991 American Association of Colleges of Pharmacy presidential address, Popovich stated that students “must understand peer and self assessment are necessary and continual components of practice quality and personal growth and that this should not be first experienced in practice but within the educational domain”(8). In the concept of educational care, periodic assessment strategies demand student reflection upon individual growth and the establishing of goals for continual growth. Further, Popovich stated that “students must learn and develop habits about accountability and to document that effort”(8). These habits must be created within the course of pharmaceutical education so they become a norm in practice, regardless of the practice setting.

Specifically, this project developed, implemented, and evaluated an anonymous peer assessment system for group project work in an undergraduate Pharmacy Practice laboratory course. The strategy promoted in this research project was the incorporation of peer assessment with the traditional instructor assessment process in determining a student’s final course grade. The anonymity aspect of the system refers to providing feedback without reference of peer group members’ names. In addition, the feedback helps to relate a student’s self assessment with his/her peer assessments. This is important in the case where the student’s self assessment (i.e., high) is not consistent with the peer assessments (i.e., low).

The specific objectives of this project were: i. developing and implementing a peer assessment process to be used with fourth collegiate year pharmacy students enrolled in an undergraduate pharmacy practice laboratory; ii. assessing student attitudes about peer assessment and its perceived utility; and iii. evaluating the effectiveness of a peer assessment process in facilitating student improvement in group project work.

METHODS

Peer/Self Assessment Instruments. This paper reports the findings of a study project which took place during the 1995 Spring semester. The project had been pilot tested during the 1993 Spring semester. Mid-semester and final peer/self assessment forms (Appendix A and B) and feedback forms (Appendix C and D) were developed and pilot tested with half of the students (i.e., 83 students assigned to 15 work groups) in the same course during the 1993 Spring semester(9). Each assessment instrument contained ten items and utilized the following assessment scale:

5 = Student is consistently effective with excellent contributions in this area (could serve as a model).
3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level).
1 = Student is inconsistent or provides inappropriate contributions in this area.

The items on each peer/self assessment instrument represented attributes of interpersonal and group work abilities. Items one through eight were identical on the mid-semester and final assessment instrument. Items nine and ten differed between the mid-semester and final assessment to reflect additional laboratory activities during this specific time frame of the semester. For example, the final assessment contained more statements dealing with the course’s field experience project which was scheduled for group presentation at the end of the semester. Although it was understood that using different items in these two assessments posed a limitation within the study, this approach was deemed necessary because the differing assessment items more accurately reflected the laboratory activities occurring during those specific time periods. The items were developed by the authors based on a literature review of attributes necessary for effective small group work discussions. The content validity of the assessment items was determined through a review by three Pharmacy Practice faculty members knowledgeable in peer assessment and ability-based outcome goals.

Originally, in the pilot study(9), a five-point Likert format scale for responses ranging from strongly agree across to strongly disagree was utilized. However, it was determined that the scale could have wide variation in meaning to the individual student. Consequently, in this project, the aforementioned behaviorally-anchored rating scale was developed and utilized.

Student Attitudes. As part of the pilot project, a 21-item questionnaire was developed by the authors for student attitude determination. The attitude survey items represented different facets of peer and self assessment; such as


assessing others, receiving and giving feedback, comparing self and peer assessments, and including peer or self assessments as a component of a student’s final course grade. The content validity of the attitude survey was assessed through a review by three Pharmacy Practice faculty members knowledgeable in peer assessment and ability-based outcome goals.

During the 1995 Spring semester, student attitudes toward the process was assessed by including six items pertaining to the exercise on the final course evaluation. The six items were selected from the attitude survey developed for the pilot study (Appendix E). The students responded to the statements using a five-point Likert format scale ranging from strongly agree to strongly disagree.

**PHPR 469—Principles of Pharmacy Practice II.** The student involved in this peer assessment process were enrolled in PHPR 469 during the 1995 Spring semester. Principles of pharmacy Practice II (PHPR 469) is a required, two credit hour course taught during the second semester of the pharmacy students’ third professional year (i.e., fourth year in college) with a typical enrollment of between 150-180 students. Traditionally, students are assigned to one of six laboratory sections of approximately 25 to 30 students each. Two or three instructors (all licensed as pharmacists) are assigned to each laboratory section.

The course consists of one hour of lecture per week and a three hour weekly integrating laboratory which has been described previously(10). The problem-based activities in the course have remained the same, however, each group was assigned to a field experience in lieu of the in-class long term project. Through a structured field experience, each group learned about one community health service/clinic or social service agency and identified positive opportunities for pharmacist services. The field experience culminated in a group written report and a thirty minute oral presentation to the remainder of the students in the laboratory section during one of the last two weeks of the semester. Therefore, the field experience project required the group members to meet also outside of laboratory on a limited basis. Specific items corresponding to this activity were included on both assessment instruments.

During the first laboratory, the students were randomly assigned to work groups. Each group consisted of five to six members and the group composition remained constant for the duration of the semester. Students spent the majority of laboratory time each week working in their small group; each student being accountable to participate and contribute to the completion of the weekly exercise objectives.

**Orientation of Students to Peer/Self Assessment.** It was determined that the instructor presentation and explanation of peer assessment was extremely important to the acceptance of peer assessment by the students. According to Weaver and Cotrell, “there is more to the process of peer assessment than simply the desire to implement it. Basically, the effectiveness of the procedure depends upon its presentation”(6). Consequently, during the first lecture and first laboratory sessions of the course, the concept of peer assessment was explained to the students and included the purpose, importance, and benefits of the process. In addition, the assessment items, feedback process, assessment scale, and grading system were explained. The group interaction attributes were explained and examples of good and bad group participation were orally described so that the students had an understanding about the behaviors they were looking for in the assessment process. For purposes of consistency, the primary author of this article presented the orientation explanation to the students during the first lecture and to each laboratory section.

The proper use and interpretation of the assessment scale was included in the orientation. When using the assessment scale, students were instructed to start with an assessment of “three” (appropriate or satisfactory for a student at this level) and go higher (i.e., four or five) or lower (i.e., one or two) if necessary. Students were encouraged to carefully differentiate between students on the assessment items and between items for an individual student. Students were asked to provide honest and realistic assessments which identified strengths and weaknesses for each group member. For example, it would be easy to give all group members a perfect evaluation, however, that might not be realistic and would not benefit the student or the group. The students had practice using this assessment scale format as it was also utilized in other performance assessments in the course (i.e., interactive counseling assessment, field experience oral presentation assessment).

A goal of the orientation to the students was to make the students feel comfortable with the process of receiving and giving assessment feedback. This was necessary for the students to benefit from the assessment and feedback process. In addition, it was stressed to the students that as professionals and a member of the health care team, it would be necessary for each individual to work effectively with others. Further, as future professionals, they would be asked to assess co-workers as peer assessments are often included in the performance appraisal process in many employment settings. Therefore, this exercise provided the student the opportunity to practice these abilities while still in School and prior to encountering them as future professionals. The mid-semester and final group interaction attributes (assessment items) were included in the course manual.

**Peer/Self Assessment Process.** Peer assessment was planned twice during the semester. The first peer assessment occurred during the mid-semester (week eight) laboratory session. Students were provided an opportunity to use the attribute form to assess the other group members as well as themselves individually. At that time, a copy of the assessment items and a prepared Center for Instructional Services (CIS) transoptic score sheet were distributed to each student for completion. Each student received one CIS score sheet with the name of each of his/her group members handwritten with a red, felt-tip marker above the ten dedicated spaces for recording his/her assessments. Students

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Mean (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-semester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>3.85 (0.39)</td>
<td>2.80-4.85</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>3.83 (0.49)</td>
<td>2.70-4.90</td>
</tr>
<tr>
<td>Final</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>4.33 (0.38)</td>
<td>3.15-5.00</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>4.32 (0.46)</td>
<td>3.20-5.00</td>
</tr>
</tbody>
</table>

Table I. Summary of overall mean score for mid-semester and final peer and self-assessments for the enrolled students (n = 152)
were asked to record their self assessments in the ten items under their own name. In addition, students were encouraged to include, if desired, handwritten comments appropriate to an individual, some group members, or the entire group on the reverse side of the assessment form. Students were asked to phrase their handwritten comments (i.e., negative and/or positive) in a constructive manner. For administration purposes, students were dispersed throughout the laboratory, so that each group member could evaluate his/her peers with total confidentiality. CIS transoptic score sheets were utilized so that the assessment responses could be tabulated (read) onto a computer disc.

Turn around time for feedback presentation to the students was one week as students received a feedback sheet included the student’s name. The mid-semester assessment did not contribute to a student’s final course grade but rather served as practice and gave the students an opportunity to give and receive feedback on group interaction abilities.

The peer assessment process was repeated at the end of the semester (during the next to last laboratory session). Feedback to the students was presented in the same manner as with the mid-semester assessment and was distributed to the students during the final laboratory session. A student’s average final peer assessment was used to calculate point contribution toward his/her final course grade for this ability. Ten percent (i.e., 50 points) of the student’s final course grade was attributed to group interaction ability assessment. For example, to calculate point contribution, an overall peer assessment average of three (appropriate for a student at this level) represented a score of 80 percent (i.e., 50 out of 50 points). An example of a completed final peer/self group interaction assessment feedback form as presented to the students is presented (Appendix F).

RESULTS
One hundred fifty two students assigned to 28 work groups participated in this project during the 1995 Spring semester. SAS statistical package was used in analyzing the results of the peer/self assessments(11). The peer and self assessment results were analyzed using repeated measures analysis of variance. These analyses included comparing: mid-semester peer assessments to mid-semester self assessments, final peer assessments to final self assessments, mid-semester peer assessments to final peer assessments, and mid-semester self assessments to final self assessments. By convention, a probability level of 0.05 was used to demonstrate significance for all analyses.

Each student’s peer assessments were averaged for each of the ten assessment items and assigned a point value using the scale of five = student is consistently effective with excellent contributions in this area across to one = student is inconsistent or provides inappropriate contributions in this area.

Difference in mean response significant at $P<0.05$. 

Table II. Comparison of mean mid-semester peer and self assessments by item for the enrolled students* (n = 152)

<table>
<thead>
<tr>
<th>Assessment item</th>
<th>Mid-semester Mean (SD)</th>
<th>Self Assess. Mean (SD)</th>
<th>F-ratio</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This person actively contributes to group discussions.</td>
<td>3.92 (0.58)</td>
<td>3.95 (0.72)</td>
<td>0.31</td>
<td>0.576</td>
</tr>
<tr>
<td>2. This person reflectively listens to the opinions and contributions of others.</td>
<td>3.99 (0.46)</td>
<td>4.02 (0.73)</td>
<td>0.30</td>
<td>0.587</td>
</tr>
<tr>
<td>3. This person allows others the opportunity to freely voice their opinion in the group.</td>
<td>3.40 (0.47)</td>
<td>4.03 (0.74)</td>
<td>0.24</td>
<td>0.625</td>
</tr>
<tr>
<td>4. This person helps to redirect discussion/activities when the group gets “off track” with a task.</td>
<td>3.41 (0.50)</td>
<td>3.57 (0.74)</td>
<td>6.05</td>
<td>0.015b</td>
</tr>
<tr>
<td>5. This person exercises mutual respect for others in the group.</td>
<td>4.07 (0.51)</td>
<td>4.12 (0.75)</td>
<td>0.60</td>
<td>0.442</td>
</tr>
<tr>
<td>6. This person uses logical organization when explaining knowledge, opinion, or insights.</td>
<td>3.83 (0.50)</td>
<td>3.70 (0.74)</td>
<td>3.99</td>
<td>0.048b</td>
</tr>
<tr>
<td>7. This person does not monopolize group discussions.</td>
<td>3.95 (0.50)</td>
<td>3.79 (0.82)</td>
<td>5.70</td>
<td>0.018b</td>
</tr>
<tr>
<td>8. This person is prepared for laboratory each week.</td>
<td>3.69 (0.56)</td>
<td>3.41 (0.78)</td>
<td>22.64</td>
<td>0.0001b</td>
</tr>
<tr>
<td>9. This person has helped in planning the group’s field experience project to date.</td>
<td>3.52 (0.64)</td>
<td>3.55 (0.87)</td>
<td>0.27</td>
<td>0.606</td>
</tr>
<tr>
<td>10. This person works well with the other group members.</td>
<td>4.12 (0.53)</td>
<td>4.16 (0.73)</td>
<td>0.42</td>
<td>0.518</td>
</tr>
</tbody>
</table>

*Scale: 5 = Student is consistently effective with excellent contributions in this area (could serve as a model). 3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level). 1 = Student is inconsistent or provides inappropriate contributions in this area. 

bDifference in mean response significant at $P<0.05$.
Corresponding to this, a significant difference was found in response from the mid-semester peer assessments. The mean response for each of the eight items for the peer assessments (comparing mid-semester to final) was significantly greater than the mean mid-semester to final. Again, with all eight items, the mean final peer assessment was significantly greater than the mean mid-semester self assessment. The significantly greater peer and self assessments at the final administration compared to the mid-semester administration suggest that student group interaction abilities improved over the course of the semester and this was discerned by the students in both peer and self assessments.

Table III. Comparison of mean final peer and self assessments by item for the enrolled students\(^a\)(n = 152)

<table>
<thead>
<tr>
<th>Assessment item</th>
<th>Final Peer Assess. Mean (SD)</th>
<th>Final Self Assess. Mean (SD)</th>
<th>F-ratio</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This person actively contributes to group discussions.</td>
<td>4.39 (0.49)</td>
<td>4.41 (0.61)</td>
<td>0.16</td>
<td>0.692</td>
</tr>
<tr>
<td>2. This person reflectively listens to the opinions and contributions of others.</td>
<td>4.40 (0.45)</td>
<td>4.39 (0.59)</td>
<td>0.00</td>
<td>0.995</td>
</tr>
<tr>
<td>3. This person allows others the opportunity to freely voice their opinion in the group.</td>
<td>4.41 (0.45)</td>
<td>4.39 (0.65)</td>
<td>0.22</td>
<td>0.638</td>
</tr>
<tr>
<td>4. This person helps to redirect discussion/activities when the group gets “off track” with a task.</td>
<td>3.94 (0.52)</td>
<td>4.02 (0.73)</td>
<td>1.92</td>
<td>0.168</td>
</tr>
<tr>
<td>5. This person exercises mutual respect for others in the group.</td>
<td>4.47 (0.44)</td>
<td>4.57 (0.56)</td>
<td>4.45</td>
<td>0.037(^b)</td>
</tr>
<tr>
<td>6. This person uses logical organization when explaining knowledge, opinion, or insights.</td>
<td>4.31 (0.47)</td>
<td>4.14 (0.70)</td>
<td>8.39</td>
<td>0.0043(^b)</td>
</tr>
<tr>
<td>7. This person does not monopolize group discussions.</td>
<td>4.40 (0.44)</td>
<td>4.37 (0.67)</td>
<td>0.34</td>
<td>0.558</td>
</tr>
<tr>
<td>8. This person is prepared for laboratory each week.</td>
<td>4.15 (0.51)</td>
<td>3.93 (0.75)</td>
<td>13.66</td>
<td>0.0003(^b)</td>
</tr>
<tr>
<td>9. This person helped in “carrying out” (executing) the group’s field experience project.</td>
<td>4.35 (0.54)</td>
<td>4.38 (0.71)</td>
<td>0.42</td>
<td>0.517</td>
</tr>
<tr>
<td>10. This person worked well with the other group members on the group’s field experience project.</td>
<td>4.53 (0.45)</td>
<td>4.56 (0.56)</td>
<td>0.28</td>
<td>0.598</td>
</tr>
</tbody>
</table>

\(^a\)Scale: 
5 = Student is consistently effective with excellent contributions in this area (could serve as a model). 
3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level). 
1 = Student is inconsistent or provides inappropriate contributions in this area. 
\(^b\)difference in mean response significant at \(P<0.05\).

Inconsistent or provides inappropriate contributions in this area. Table I presents a summary of overall peer and self assessment averages for the mid-semester and final peer and self assessments for the 152 students.

Peer and self assessments were compared at the mid-semester and final administration of the assessment. When comparing peer to self assessments, there was no significant difference in six of the ten assessment items on the mid-semester assessment (Table II) and in seven of the ten items on the final administration (Table III). Therefore, it was concluded that the students were generally consistent at self assessment (when compared to peer assessment). Interestingly, when looking at the seven specific items where peer and self assessments differed statistically (#4, #6, #7, and #8 — mid-semester assessment and #5, #6, and #8 — final assessment), peer assessments were higher than self assessments on five of the seven items. In other words, when a student’s peer and self assessment were statistically different, students tended to rate themselves lower. This suggests that at times, a student may underestimate his/her contributions to group activity and he/she may not realize his/her positive contribution to the process of accomplishing group goals. This finding corroborates the study presented in the literature by Falchikov(13). This finding also corroborates results obtained from the pilot study(9).

However, it cannot be discounted that the higher final peer assessments may reflect student desire to influence positively the grades of his/her group members.

It is relevant to include observations regarding the handwritten comments offered by students on the mid-semester and final peer/self assessments. Students were encouraged to include written comments for an individual student or entire group, if desired. Handwritten comments received were rewritten by the instructors and included on the appropriate (i.e., individual student or entire group) feedback sheet(s). In general, it was observed that the majority of handwritten comments received were complimentary and referred to an entire group (i.e., “We worked well together as a group. I would work with them all again.”). The majority of the handwritten comments received for individual students were also complimentary (i.e., “Student X is very good about going out of her way to help the group and volunteers to take care of things.”). Results obtained from the pilot study corroborate these observations(9).

Student attitude toward the process was assessed at the end of the semester with the completion of a course evaluation (Appendix E). The majority of the students indicated that peer assessment of group interaction abilities was important to his/her personal growth as a professional (i.e., 64 percent of students indicated agreement or strong agreement...
Table IV. Comparison of mean mid-semester and final peer assessments by item for the enrolled students\(^a\) (n = 152)

<table>
<thead>
<tr>
<th>Assessment item</th>
<th>Mid-semester Mean (SD)</th>
<th>Final Peer Assess. Mean (SD)</th>
<th>F-ratio</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This person actively contributes to group discussions.</td>
<td>3.92 (0.58)</td>
<td>4.39 (0.49)</td>
<td>139.38</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>2. This person reflectively listens to the opinions and contributions of others.</td>
<td>3.99 (0.46)</td>
<td>4.40 (0.45)</td>
<td>93.64</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>3. This person allows others the opportunity to freely voice their opinion in the group.</td>
<td>3.40 (0.47)</td>
<td>4.41 (0.45)</td>
<td>102.76</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>4. This person helps to redirect discussion/activities when the group gets “off track” with a task.</td>
<td>3.41 (0.50)</td>
<td>3.94 (0.52)</td>
<td>2.23</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>5. This person exercises mutual respect for others in the group.</td>
<td>4.07 (0.51)</td>
<td>4.47 (0.44)</td>
<td>2.00</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>6. This person uses logical organization when explaining knowledge, opinion, or insights.</td>
<td>3.83 (0.50)</td>
<td>4.31 (0.47)</td>
<td>2.63</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>7. This person does not monopolize group discussions.</td>
<td>3.95 (0.50)</td>
<td>4.40 (0.44)</td>
<td>2.28</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>8. This person is prepared for laboratory each week.</td>
<td>3.69 (0.56)</td>
<td>4.15 (0.51)</td>
<td>116.00</td>
<td>0.0001(^b)</td>
</tr>
</tbody>
</table>

\(^a\)Scale:
1 = Student is inconsistent or provides inappropriate contributions in this area.
3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level).
5 = Student is consistently effective with excellent contributions in this area (could serve as a model).

\(^b\)Difference in mean response significant at \(P<0.05\).

Table V. Comparison of mean mid-semester and final self assessments by item for the enrolled students\(^a\) (n = 152)

<table>
<thead>
<tr>
<th>Assessment item</th>
<th>Mid-semester Self Assess. Mean (SD)</th>
<th>Final Self-Assess. Mean (SD)</th>
<th>F-ratio</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This person actively contributes to group discussions.</td>
<td>3.95 (0.72)</td>
<td>4.41 (0.61)</td>
<td>51.59</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>2. This person reflectively listens to the opinions and contributions of others.</td>
<td>4.02 (0.73)</td>
<td>4.39 (0.59)</td>
<td>31.15</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>3. This person allows others the opportunity to freely voice their opinion in the group.</td>
<td>4.03 (0.74)</td>
<td>4.39 (0.65)</td>
<td>27.05</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>4. This person helps to redirect discussion/activities when the group gets “off track” with a task.</td>
<td>3.57 (0.74)</td>
<td>4.02 (0.73)</td>
<td>41.92</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>5. This person exercises mutual respect for others in the group.</td>
<td>4.12 (0.75)</td>
<td>4.57 (0.56)</td>
<td>46.52</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>6. This person uses logical organization when explaining knowledge, opinion, or insights.</td>
<td>3.70 (0.74)</td>
<td>4.14 (0.70)</td>
<td>38.62</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>7. This person does not monopolize group discussions.</td>
<td>3.79 (0.82)</td>
<td>4.37 (0.67)</td>
<td>68.05</td>
<td>0.0001(^b)</td>
</tr>
<tr>
<td>8. This person is prepared for laboratory each week.</td>
<td>3.41 (0.78)</td>
<td>3.93 (0.75)</td>
<td>52.57</td>
<td>0.0001(^b)</td>
</tr>
</tbody>
</table>

\(^a\)Scale:
1 = Student is inconsistent or provides inappropriate contributions in this area.
3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level).
5 = Student is consistently effective with excellent contributions in this area (could serve as a model).

\(^b\)Difference in mean response significant at \(P<0.05\).

with the statement), increased his/her accountability to other group members (i.e., 71 percent of students indicated agreement or strong agreement with the statement), and helped in the development of work skills within a group (i.e., 68 percent of student indicated agreement or strong agreement with statement). Students also indicated that receiving constructive feedback helped in identifying his/ her group work strengths and weaknesses (i.e., 80 percent of students indicated agreement or strong agreement with the statement) and comparing peer and self assessments helped to identify “blind spots” in his/her group work performance (i.e., 75 percent of students indicated agreement or strong agreement with the statement). Concern was demonstrated, however, over using the final peer assessment to calculate point contribution toward a student’s final course grade for this ability (i.e., 47 percent of students indicated disagreement or strong disagreement with the statement “I believe peer assessment rating of group interaction abilities should be a component of a person’s final course grade.”). Results obtained from the pilot study corroborate these findings(9).

**DISCUSSION**

The authors cannot emphasize enough the importance of the orientation presentation and explanation of the assessment process to the students by the instructor. The nature of this explanation directly affects the acceptance and understanding of the assessment process by the students. The instructor’s explanation of and attitude toward peer assessment impacts the attitude and acceptance of the process by the students. This initial instructor explanation of the process should take place early in the semester (i.e., first or second week of class). It is suggested that the information presented by the instructor include an explanation of the assessment process (i.e., administration dates, procedure for feedback, plan for including feedback in course grade), the assessment items coupled to an explanation of good and bad
small group work behavior, the assessment scale used with the items, and the benefits and value of the process to the individual as a student and a future health care professional.

For purposes of continuity and organization, the peer assessment process explanation must be comprehensive and uniform across all laboratory sections. Pharmacy Practice 469 laboratories involve several instructors. To ensure continuity and comprehensiveness of the presentation between laboratory sections, an outline of information to be presented by each instructor is suggested if this task by one individual is too great. In addition, a pre-course laboratory instructors’ meeting coupled with the outline of information to be presented is suggested.

According to Helms and Haynes, peer assessments need to be confidential for maximum effectivenss(14). During the completion of the peer/self assessments, it is the responsibility of the instructor to protect the privacy and confidentiality of each student’s assessments. Therefore, the instructor should ask the students to disperse within the room/laboratory while they complete the peer/self assessments away from fellow group members. This allows the students the opportunity to feel comfortable and encourages honest and confidential assessments of their group members. The students should not remain together in their groups while completing the assessments because they could easily observe the assessments completed by their group members or be observed themselves.

Often times, faculties desire to implement group activities in their instruction. However, a frequent outcome is that one student emerges as the leader and does a majority of the work, two or three provide support and input as needed, and one or two students contribute little. In the end, typically, all the students in the group benefit from a good grade when in fact only a few actively contributed. The outcome too is disgruntled students who believe one or two students have gotten by without any effort. Thus, peer assessment can be a means to determine and reward one’s effort to group activity. Throughout the semester, students are continually reminded by the instructors that they are expected to provide honest and realistic assessments. While it is difficult sometimes for a student to be honest, and in the case of someone who has not contributed to give a harsh assessment, it ultimately benefits the student because the student who has not contributed has received what he/she deserved.

Reviewing the proper/correct use of the assessment scale is also encouraged at each administration. The behaviorally-anchored assessment scale utilized for this project did not provide descriptors for assessment responses of “two” and “four”. Because of this, some students did not understand that they could provide an assessment of “two” and/or “four”. Therefore, to make the criteria more explicit and the process more “user friendly” for the students, it is suggested to give descriptors for both a response of “two” and “four” with the behaviorally-anchored rating scale. Although the following scale has not been tested, a conceivable adaptation is the following:

5 = Student is consistent and provides excellent contributions in this area.
4 = Student is generally consistent and provides very good contributions in this area.
3 = Student is somewhat consistent and provides satisfactory contributions in this area (appropriate for a student at this level).
2 = Student is somewhat inconsistent and provides below satisfactory contributions in this area.
1 = Student is inconsistent and provides inappropriate contributions in this area.

With the use of several instructors over the various sections, it is crucial that the instructors administer the assessments during the same week. It is also necessary for the instructors to turn in all completed assessments to one individual so that the assessments can be delivered to the computing center at one time. This requires the cooperation and accountability of all instructors. For example, if a student is absent from the class period dedicated to assessment administration, it is the responsibility of the instructor to contact that student (i.e., through course lecture, telephone) to have him/her complete the assessment on time.

While peer assessment has positive merit, it does present several problems. This is especially evident if the assessment is performed at strategic points during (formative) and at the end of the instructional period (summative). Criticism, is after all, criticism. To encourage the student evaluators to be objective in their assessments and to help students value the assessments of their peers, the instructor must ensure that the feedback to the student is presented in an anonymous, constructive manner. This is important to ensure that each group member benefits from this experience and is not adversely affected by any negative criticism/feedback he/she provides and receives.

The turn around time for presenting the feedback to the students should not be longer than one week, and therefore the cooperation of all instructors is required. It is a given that the preparation of the feedback takes a considerable amount of time. The instructors must be willing to dedicate time and effort to prepare anonymous and constructive feedback. Preparing the feedback sheets requires the transcription of the average peer assessment and self assessment onto the feedback sheet for each student. In addition, it is important and beneficial to give the handwritten comments from student peers as feedback, but they should be rewritten by the instructor. Such feedback is superior to feedback that is returned in a student’s own handwriting because a student may recognize the handwriting of another group member.

According to Johnson, while the peer assessment system takes some instructor time to prepare the instrument and compute the points, it is worth the effort because the student is in a better position than the instructor to evaluate each team member’s performance.

It is recommended that the feedback sheets be distributed to the students just prior to leaving the room at the end of the class period. As mentioned earlier, students may feel uncomfortable with receiving the feedback sheets if they are still seated with their group members and these can serve as a distraction when other activities are being conducted in the lab.

It is recommended that peer assessments be a component of a student’s final course grade. This is consistent with the information presented in the literature where the majority of the studies presented included peer assessment as a component of the final course grade. In PHPR 469, small group work is a major element of the course process (i.e., students work with group members each week); therefore, it is appropriate for the peer assessments to be included in the final course grade. Again, group members have the advantage over instructors in that he/she has first hand knowledge of group performance/interactive abilities of his/her peers (4). Thus, there was no attempt to have the
instructors assess the group interaction ability of each student. Consequently, there is no ability to compare peer assessment with an instructor assessment of a student’s performance.

To maximize student familiarity with this process, it would be wise to develop group interaction assessments that can be used in other courses in which the student is enrolled. Thus, as the student progresses through the pharmacy curriculum, he/she becomes accustomed to these assessments and one begins to think in terms of his/her own and others’ contributions to group activities. The incorporation of a common peer assessment system within a curriculum would help provide continuity between the courses and would contribute to on-going monitoring of student development of interpersonal and group work abilities. To an extent, this has already taken place at Purdue University. For example, Pharmacy Administration 243 (Pharmacy in the Health Care system), a core curriculum course taught to first year professional students, also utilizes a peer assessment system for small group project work. The peer assessment items developed for this project have been adapted for use in PHAD 243. In addition, the peer assessment items developed for this project have been adapted and utilized in a Fund for the Improvement of Post-Secondary Education (FIPSE) project during the 1994 Spring semester. It is recommended that such continuity and commonality of assessment instrument usage across courses and projects be a priority.

**SUMMARY AND CONCLUSION**

For this research project, in general, self assessments mirrored peer assessments. However, when a student’s peer and self assessments differed, self assessments tended to be lower. Final self and peer assessments were significantly higher than mid-semester self and peer assessments suggesting that group work abilities of these students were perceived to have improved over the course of the semester. Results from the course evaluation suggested that students were generally positive toward peer and self assessment. The students, however, demonstrated concern regarding the inclusion of peer assessments in their final course grade.

As more faculty within pharmaceutical education execute ability-based learning, a system of accountability must be implemented that rewards those who contribute and penalizes those who do not. Otherwise, even the best planned ability-based learning exercises will fall short because of some students’ apathy (i.e., why work when everyone gets the same grade?). There must be some assessment instrument that is more than subjective, and peer/self assessment is an example of an objective barometer. Peer assessment in small group work which provides for feedback to the student helps the student understand, learn, and develop abilities in interpersonal and group work effectiveness, in communication strategies, and in performance assessment. According to Popovich, peer and self assessment are necessary and continual components of practice quality and personal growth and that this should not be first experienced in practice but within the educational domain(8). In the concept of educational care, periodic assessment strategies demand student reflection upon individual growth and the establishing of goals for continual growth. Peer and self assessment are important to the execution of pharmacy practice and effective interdisciplinary teamwork is essential within current and future pharmacy environments.

**Acknowledgements.** The primary author of this paper recognizes Dr. Robert K. Chalmers and Dr. Holly L. Mason, Department of Pharmacy Practice, Purdue University, for their helpful suggestions and assistance with this project. Dr. Gary L. Wright, Center for Instructional Services (CIS), Purdue University, assisted by developing a process for scoring the peer/self assessments which utilized existing CIS test score sheets and computing center. Alverno College Institute, Milwaukee, Wisconsin, is recognized for their dedication and commitment to teaching and assessing student abilities which encouraged a project of this nature.


**References**


**APPENDIX A. MID-SEMESTER PEER/SELF GROUP INTERACTION ASSESSMENT**

Please evaluate each member of your PHPR 469 group. Evaluate their performance over the first half of the semester. You are expected to evaluate each member honestly. Please record your evaluation responses for an individual below their name as indicated on the score sheet. Additional “hand-written” comments may be included on the back of this page. Turn in this sheet and your score sheet once you have completed the evaluations. Be assured that your confidentiality will be maintained. Thank you. Please indicate your responses on the score sheet using the following rating guide.

- 5 = Student is consistently effective with excellent contributions in this area (could serve as a model).
- 3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level).
- 1 = Student is inconsistent or provides inappropriate contributions in this area.
APPENDIX B. FINAL PEER/SELF GROUP INTERACTION ASSESSMENT

Please evaluate each member of your PHPR 469 group. Evaluate their performance over the entire semester. You are expected to evaluate each member honestly. Please record your evaluation responses for an individual below their name as indicated on the score sheet. Additional “hand-written” comments may be included on the back of this page. Turn in this sheet and your score sheet once you have completed the evaluations. Be assured that your confidentiality will be maintained. Thank you. Please indicate your responses on the score sheet using the following rating guide.

1 = Student is inconsistent or provides inappropriate contributions in this area.
3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level).
5 = Student is consistently effective with excellent contributions in this area (could serve as a model).

For each assessment item, the average of your peer assessments is indicated below. Your self assessment is included for comparative purposes. Any “hand written” comments that were received have been re-written below for your information.

Assessment item 5 4 3 2 1
1. This person actively contributes to group discussions (e.g., provides ideas, shares insights). A B C D E
2. This person reflectively listens to the opinions and contributions of others. A B C D E
3. This person allows others the opportunity to freely voice their opinion in the group. A B C D E
4. This person helps to redirect discussion/activities when the group gets “off track” with a task. A B C D E
5. This person exercises mutual respect for others in the group. A B C D E
6. This person uses logical organization when explaining knowledge, opinion, or insights. A B C D E
7. This person does not monopolize group discussions. A B C D E
8. This person is prepared for laboratory each week. A B C D E
9. This person has helped in planning the group’s field experience project to date. A B C D E
10. This person works well with the other group members. A B C D E

APPENDIX C. MID-SEMESTER PEER/SELF GROUP INTERACTION ASSESSMENT FEEDBACK

For each assessment item, the average of your peer assessments is indicated below. Your self assessment is included for comparative purposes. Any “hand written” comments that were received have been re-written below for your information.

5 = Student is consistently effective with excellent contributions in this area (could serve as a model).
3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level).
1 = Student is inconsistent or provides inappropriate contributions in this area.

Assessment item 5 4 3 2 1
1. This person actively contributes to group discussions (e.g., provides ideas, shares insights). A B C D E
2. This person reflectively listens to the opinions and contributions of others. A B C D E
3. This person allows others the opportunity to freely voice their opinion in the group. A B C D E
4. This person helps to redirect discussion/activities when the group gets “off track” with a task. A B C D E
5. This person exercises mutual respect for others in the group. A B C D E
6. This person uses logical organization when explaining knowledge, opinion, or insights. A B C D E
7. This person does not monopolize group discussions. A B C D E
8. This person is prepared for laboratory each week. A B C D E
9. This person has helped in planning the group’s field experience project to date. A B C D E
10. This person works well with the other group members.

Hand-written comments:

Average

APPENDIX D. FINAL PEER/SELF GROUP INTERACTION ASSESSMENT FEEDBACK

For each assessment item, the average of your peer assessments is indicated below. Your self assessment is included for comparative purposes. Any “hand written” comments that were received have been re-written below for your information.

5 = Student is consistently effective with excellent contributions in this area (could serve as a model).
3 = Student is generally effective with satisfactory contributions in this area (appropriate for a student at this level).
1 = Student is inconsistent or provides inappropriate contributions in this area.

Assessment item 5 4 3 2 1
1. This person actively contributes to group discussions (e.g., provides ideas, shares insights). A B C D E
2. This person reflectively listens to the opinions and contributions of others. A B C D E
3. This person allows others the opportunity to freely voice their opinion in the group. A B C D E
4. This person helps to redirect discussion/activities when the group gets “off track” with a task. A B C D E
5. This person exercises mutual respect for others in the group. A B C D E
6. This person uses logical organization when explaining knowledge, opinion, or insights. A B C D E
7. This person does not monopolize group discussions. A B C D E
8. This person is prepared for laboratory each week. A B C D E
9. This person has helped in planning the group’s field experience project to date. A B C D E
10. This person works well with the other group members.
APPENDIX E. ATTITUDE SURVEY ITEMS

Students had the opportunity to provide peer and self-assessments of group interaction abilities at mid-semester and end of the semester. The mid-semester assessment provided for feedback and guidance and did not contribute to a student’s final course grade. The final assessment contributed to the student’s final course grade. The following items deal with the group interaction assessment process.

Please respond to the following statements using the scale below:

A = strongly agree with the statement
B = agree with the statement
C = neutral about the statement
D = disagree with the statement
E = strongly disagree with the statement

1. Peer assessment of group interaction abilities is important to my personal growth as a professional.
2. Peer assessment of group interaction abilities increases my accountability to the other group members. “I have to pull my own weight.”
3. Peer assessment of group interaction abilities helps me in my development of work skills within a group.
4. Receiving constructive feedback helps me to identify strengths and weaknesses of my group work abilities.
5. Comparing peer and self assessments is helpful in identifying “blind spots” in my group work performance.
6. I believe peer assessment ratings of group interaction abilities should be a component of a person’s final course grade.

APPENDIX F. COMPLETED FINAL PEER/SELF GROUP INTERACTION ASSESSMENT FEEDBACK FORM

For each assessment item, the average of your peer assessments is indicated below. Your self assessment is included for comparative purposes. Any “hand written” comments that were received have been rewritten below for your information.

<table>
<thead>
<tr>
<th>Assessment item</th>
<th>Peer Assessment</th>
<th>Self Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>3.75</td>
<td>4.00</td>
</tr>
<tr>
<td>2.</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>3.</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>4.</td>
<td>3.50</td>
<td>3.00</td>
</tr>
<tr>
<td>5.</td>
<td>4.00</td>
<td>3.00</td>
</tr>
<tr>
<td>6.</td>
<td>3.75</td>
<td>4.00</td>
</tr>
<tr>
<td>7.</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>8.</td>
<td>4.00</td>
<td>3.00</td>
</tr>
<tr>
<td>9.</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>10.</td>
<td>3.75</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Average 3.78 3.60

Hand-written comments:
I really enjoyed working with all of my group members. They were friendly and we treated each other with respect. Not only was it a good learning experience, but I feel that I have made some new friends!!