Group Peer Review as an Active Learning Strategy in a Research Course

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The faculty of an undergraduate research course with a diverse student body recognized that many students struggled with the concept of how to critique a research article. The traditional assignment method used to teach the critique process did not maximize student learning outcomes. The active learning strategy of peer review was used to enhance student understanding and engagement in the critique process. This active learning strategy involved small groups of students who worked together as a team to evaluate the work of other student groups using a critique-rubric. This article describes the development and incorporation of a peer review activity into an undergraduate research course

Faculty who teach at the college level are often faced with the challenge of how to facilitate higher levels of student engagement and learning among undergraduate students. More than 20 years ago, based on research on college teaching and learning, Chickering (1987) identified the use of active learning strategies as a key part of good practice in undergraduate education. The concept of active learning has been identified in the literature as a useful methodology for helping students to be actively involved in their own learning, attain complex objectives, think critically, and solve problems (Bonner, 1999; Bonwell & Eison, 1991; Page, 2001; Vos & Graaff de, 2004). Examples of active learning include, but are not limited to, peer review, pair shares, role playing, debate, case studies, and cooperative learning (Bonwell & Eison, 1991). The philosophy of active learning fosters student engagement by emphasizing students' responsibility for their own learning as well as that of their peers. When the emphasis shifts from students being passive recipients of knowledge, a higher level of learning is thought to occur. This higher level of learning is based on the principles of metacognition (Vos & Graaff de, 2004).

The purpose of this article is to describe how the faculty of an undergraduate research course incorporated the active learning strategy of peer review into a classroom activity that involved the critique of a research article. Peer review, or peer evaluation, within the context of this paper, is defined as the involvement of students in the evaluation process of other students' work (Pond & Ul-Haq, 1997; Rieber, 2006; Topping, 2005; van den Berg, Admiraal, & Pilot, 2006). This project contributes to the literature on active leaning strategies because there is a paucity of practical information on methods that can be used to integrate active learning strategies into undergraduate research courses.

Review of Literature

Traditionally in the undergraduate nursing research course, students were taught conceptual principles of

research and then were asked to critique a research article on a topic of their choice. Students then submitted a rough draft of their critique to the instructor for constructive feedback. Faculty evaluated each individual critique and gave students written feedback. The students then had the opportunity to revise and resubmit their papers for grading. The faculty recognized that many students struggled with the process of how to critique a research article. addition, the current process did not maximize student learning, did not facilitate higher levels of learning, and did not actively engage student learning. Therefore, the faculty modified the critique assignment so that it incorporated an interactive peer review activity into the research article critique assignment.

Active Learning

Active learning provided the framework that guided this project. Important characteristics of active learning are: 1) active engagement of students in learning, 2) students taking responsibility for their own learning, and sometimes for the learning of others, 3) teachers providing activities that facilitate active learning, instead of simply transferring information (Bonwell & Eison, 1991; Kane, 2004; Page, 1990). Active learning activities promote a higher level of learning through an emphasis on students' abilities to control their learning environments and develop interdependent or cooperative relationships with other students (Vos, 2001). Active learning promotes a higher level of learning through the process of metacognition. The concern of metacognition goes beyond students' identification of their knowledge level to a focus on the learners' insight regarding what they know (Flavel, 1979, Hacker, 1998). In higher education, active learning has been used in a variety of educational programs such as web-based learning (Lohr & Ku, 2003), biology (Allen & Tanner, 2005; Smith, Stewart, Shields, Hayes-Klosteridus, Robinson, & Yuan, 2005), online learning environments (Johnson & Aragon, 2002), and engineering (Anthony, 1996; Vos & Graaff

de, 2004). Duron, Limbach, & Waugh (2006) asserted that faculty should provide multiple opportunities for students to engage in the analysis, synthesis, and evaluation levels of Bloom's taxonomy since active learning in these levels helps students think critically.

Peer Review

For the purpose of this project, peer review - also known as peer evaluation or peer assessment - is defined as a teaching strategy that involves active participation of a student in the formative evaluation of another student's work (Pond & Ul-Haq, 1997). The use of peer review as a form of assessment to evaluate learning is well documented in the higher education literature. Prins, Sluijsmans, Kirschner, and Strijbos (2005) purport that formative peer assessment is an effective way to assist students to develop the skill of providing valuable feedback and suggestions for performance improvement to another person or group in any situation. They contrast the formative peer assessment process with other assessment approaches used in higher education for purely summative purposes. Formative peer assessment helps students identify their strengths and weaknesses, develop and manage their learning processes, and work toward achieving the specified learning outcomes during the learning process itself (Gueldenzoph & May, 2002; Nicol & Macfarlane-Dick, 2006; Prins et al., 2005; Weimer, 2003).

Other researchers have used peer assessment as a specific form of collaborative learning in which students work together in small groups toward a common goal (Dillenbourg, 1999; Strijbos, Martens, & Jochems, 2004). Continuous formative feedback to the group allows students to modify behavior to assure their end product (Prins et al., 2005). The provision of summative feedback by the faculty at the conclusion of the learning experience is important. This feedback includes instructor evaluation, peer evaluation by members, and a self-evaluation by each participant. The collaborative process will then be evaluated by the students to determine whether or not they thought the process was fair. Evaluation is particularly enhanced when peer review is added to the formative evaluation process. This allows peers to work collaboratively to assess each other's work. Peer assessment used in this way assists the students in developing their negotiating skills as well as their critiquing skills.

Peer evaluation can be an effective method of collaborative assessment (Gueldenzpoh & May, 2002). It helps prepare students for the upcoming real-life experiences of giving and receiving feedback in the workplace (Gueldenzoph & May, 2002; Nicol & Macfarlane-Dick, 2006; Prins et al., 2005). In order for students to effectively participate in peer evaluation,

they need to know who will evaluate them, what the evaluation will include, when the evaluation will be done, why peer evaluations are being done, and how these peer evaluations will affect their grades (Gueldenzpoh & May, 2002).

To ensure that the peer review experience is a meaningful one for students, evaluation tools that explain the assignment's criteria are critical prior to the collaborative experience. In addition, several conditions identified by Lisk (as cited in Reese-Durham, 2005) as essential to cooperative learning are required: "... (a) a clear set of learning objectives that are accepted by all students, (b) positive interdependence, (c) positive social interaction behavior and attitudes, and (d) individual accountability." Reese-Durham (2005) used these conditions as a basis for her use and study of peer review in an educational research course. Evaluation tools then need to be shared with students so they will know how they will be evaluated. These components were a major consideration in the planning of this classroom research project.

In summary, the peer review process involves building a foundation in the classroom that supports collaborative evaluation and helps students relate to and practice real-life situations. In order for peer evaluation to be effective, faculty need to prepare and explain to students the who, what, when, how, and why of the collaborative experience so students feel capable of evaluating one another effectively and fairly.

Implementation of Group Peer Review as an Active Learning Strategy

The purpose of this group peer review activity was to encourage higher levels of thinking and collaboration among a group of students by incorporating the active learning strategy of group peer review and evaluating its effect on student learning and student satisfaction. A major focus for the nursing program was to help students develop critical thinking and collaboration skills, which they will need as future health care professionals. Developing higher order thinking skills can be challenging when students are exposed to research content for the first time. In order to engage students in the abstract process of research, they were asked to conduct a written critique on a nursing research study that reflected a clinical problem. This activity required students to engage in behaviors at the evaluation level of Bloom's taxonomy.

Thirty senior nursing students who were enrolled in a required one-semester research course participated in the group peer review activity. Students in the research course had completed two semesters of nursing and had some knowledge of clinical practice. The majority of the students were generic nursing students who had not yet taken the state licensing exam for registered nurses.

Approximately one fourth of the students were in the RN to BSN program. The RN to BSN students were practicing registered nurses who had associate degrees in nursing and had returned to the university setting to receive a BSN. All of the students were female, and the mean age was thirty. The diversity amongst these students reflected the varied composition of the entire university. Although the majority of the students were African American, many of them were English as second language and/or first-generation college students.

The group peer review activity involved several steps. First, at the beginning of the semester, each student was able to select a topic from one of six different clinical topics. Students were then placed in groups of five based on their assigned clinical topic. For example, one group was assigned pain, and each individual group member selected a research article pertaining to pain. Each student was required to do a review of literature which consisted of three research articles based on their assigned clinical topic. Students were then asked to select one of these articles to use for their critique assignment. A copy of the selected article was then submitted to the instructor in a PDF file format. These articles were then placed on WebCT so the entire class could have access to them. Using the Grading Rubric for Evaluating Rough Draft of Research Critique (Appendix A) that contained key elements of a critique, students developed an individual critique draft on their selected article. These critiques ranged from three to five pages in length.

The second step consisted of dividing the entire class into six separate working groups with five members in each group and each with a different clinical topic. Each group exchanged their five rough draft article critiques with another group and evaluated the other's work. Students prepared for this group activity ahead of time by reading all five articles of the group to which they were assigned for the group peer review. This was necessary in order for them to have time to complete a review of the rough drafts in class. During the designated class time, students then completed the Grading Rubric for Evaluating Rough Draft of Research Critique (see Appendix A) on each of the five research articles. The first two columns of the form require a "yes" or "no" response to indicate whether the criteria were met; there is also space available for the reviewer to make comments. Students were allowed the entire classroom period of 2.5 hours to complete evaluations on each of the group critiques. This allowed the group of students about 30 minutes to review each critique. At the end of the classroom period, students submitted all of the group evaluations for each of the critiques to the instructor. Students received points that totaled 5% of their grade for participating in this active learning strategy.

At the completion of the group exercise, each student was required to complete the Research Article Critique Group Peer Evaluation (see Appendix B) on the various group members. This evaluation contained five questions and provided an opportunity for students to rate their peers' involvement in the critique process using a Likert-type rating scale. Points were assigned based on the criteria listed on the evaluation. At the end of class, students submitted the rough drafts and the evaluations to the instructor.

The faculty then reviewed each critique using the Grading Rubric for Evaluating Rough Draft of Research Critique and the group process Research Article Critique Group Peer Evaluation. The following week the students received a hard copy of feedback from faculty and peers along with their grade for the group peer review process. Students then used this feedback to make any corrections or changes to their final papers. At the end of the course, students completed the Evaluation of the Group Peer Review Process (see Appendix C) to evaluate the peer review process. The evaluation contained four open-ended questions asking students to identify the positive and negative aspects of the peer review process and suggestions for improvement.

Evaluation of the Group Peer Review Process

After completion of the peer review process, the faculty evaluated the entire procedure. Overall, students were able to follow the Grading Rubric for Evaluating Rough Draft of Research Critique. Four students only checked "yes" or "no" and did not include comments on the grading rubric. About a fourth of the students had difficulty identifying whether a study was quantitative or qualitative. Other problem areas were identification of theoretical frameworks independent and dependent variables. The identification of these problems enabled faculty to help students move from lower to higher levels of thinking on Bloom's taxonomy.

While using the Research Article Critique Group Peer Evaluation, all students gave their peers top scores of ten in regard to all five questions that rated preparation and participation in the group process. The faculty knew that these peer evaluations were not always accurate because they noted approximately 20 percent of the students had not read the assigned articles prior to participating in the peer review process. It should be noted that the peer reviews were not anonymous.

Based on the students' feedback using the Evaluation of the Group Peer Review Process, 95% of the students felt the group peer review process was beneficial and helped them to gain insights into what should be included in a research critique. The most

beneficial aspects were comparing viewpoints, seeing different styles of writing, and clarifying research concepts. Factors mentioned by the students as causing dissatisfaction with the group peer review process were that it was time consuming, they did not like the topics, and they felt it was a lot of work for only five percent of their grade. Students suggested that the groups should be smaller and online drafts and articles should be accessible earlier in the semester. Overall, the students thought that participation in these group peer reviews added to their learning.

Discussion

The group peer review strategy was based on the best practice principles of Gueldenzoph & May (2002). Students participated in a group peer review activity. Topics were based on issues that were of concern to nursing and had been addressed by nurse researchers. Goals were clearly stated and evaluation tools were shared with students, who then evaluated their classmates' work. Formative feedback was given during the collaborative process so that students could incorporate the changes into their final papers (Gueldenzoph & May, 2002; Weimer, 2003). This allowed students to grow in their understanding of the critique process without being penalized. Faculty then provided summative feedback at the conclusion of the process. At the end of the peer activity, students were provided with an opportunity to evaluate their satisfaction with the process and assess individual accountability (Reese-Durham, 2005).

The instructors and students in this course felt that peer review was a valuable learning technique. These findings support those of Reese-Durham (2005), who used peer review in an educational research course. Factors that were detrimental to the process were the preparation time needed for the groups to read the articles and critiques and the extensive time needed to evaluate five critiques in class. Faculty identified another factor: some students had not prepared for the peer review activity by reading the critique drafts and articles that were posted on WebCT. Similar issues have been noted in article discussions regarding active learning strategies (Bonwell & Eison, 1991).

Overall the peer review process was an effective method for encouraging active learning and, through its focus on evaluation, higher levels of thinking on Bloom's taxonomy in the students. They were able to effectively evaluate a peer's critique using the grading rubric. Sometimes students had difficulty identifying whether a peer had met a given criterion or not. This information provided the instructors with knowledge about what to emphasize the next time the course was taught. Since the procedure was done in groups, students learned from each other and developed insights

into what they needed to improve upon in their own papers. The instructors frequently overheard students making comments that they now had a better understanding of what was required when conducting a critique after evaluating a classmate's paper. Students in the Reese-Durham (2005) study also indicated a better understanding of how to write a research paper after participating in the peer evaluation process.

Before beginning the critique process, students had to review five articles of varying length and complexity ahead of time in order to assess another group's work. Many students had not prepared by reading the articles and critiques and were not prepared to discuss the other group's work. Because of this dilemma, the faculty recommended that research articles be selected by the instructor and that groups be assigned fewer critiques to review. All the students gave each other high ratings, despite the fact that not all students were prepared. This may be related to the students being unsure of their role as an evaluator and the fact the evaluations were not anonymous. Some evaluator uncertainty was noted in the Reese-Durham (2005) study also, as evidenced by students asking whether they could write comments on the research papers and in cautiousness regarding making comments.

In order to make the process more manageable, it might have been useful to use standardized articles that students could have available to them at the beginning of the semester. Another suggestion might be to have the students develop a critique draft in pairs instead of individually, as this would decrease the preparation time. These measures would cut down on the number of papers to be reviewed during the peer review activity and would also provide them with a collaborative writing project. Another suggestion for change would be to have the students anonymously evaluate their peers' participation in the peer review activity.

There appears to be a limited number of recent research studies in the literature that explore the use of the peer review process in higher education. No research studies were found that explored peer review in a health science course, and only one was found that did so in a research course. The findings from this study provide a unique contribution to the literature because it involves the evaluation of the usefulness of peer review in a research course.

Conclusion

The group peer review active learning strategy was a positive experience for both the students and faculty. This strategy provided students with an opportunity to use higher level thinking skills, work collaboratively, and evaluate scholarly work done by their peers. They had the opportunity to see how other students developed their own critiques and learned from their mistakes as well as benefited from their accomplishments. As a result, students could use what they learned through the group peer review activity to revise and further develop their own critiques before they submitted them to faculty.

Peer review is a versatile tool that can be used in a variety of academic settings. This evaluation of peer review as an active learning strategy in a nursing research course extends the work in this area to another discipline in higher education. The authors think that peer review will be useful as an active learning strategy in research methods courses in multiple disciplines. It appears to be especially useful in courses where there is an emphasis on developing higher level thinking skills and collaboration. Active learning strategies such as peer review have impacted student success at CSU. Further studies are needed to replicate these findings and explore the usefulness of peer review in a variety of student populations. Peer review has the potential to be an effective method to promote collaborative learning and working among groups. Learning how to think critically and work among groups is a primary role of professionals and is a skill that is needed in the global workforce.

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Appendix A

Grading Rubric for Evaluating Rough Draft of Research Critique

ID	Number:	

	Discussion Questions	Yes	No
Did th	e student discuss the following in their rough draft?		
I.	Introduction		
	a. Identify what will be discussed within the critique		
Comm	ents:		
II.	Substantive & Theoretical		
	a. Importance for the nursing profession & contributions to nursing knowledge of	r	
	improving nursing practice		
	b. The "fit", along with rationale, between the research question & the methods		
	used to address the question		
	c. Identify the theory or conceptual model and then briefly describe what this		
C	theory means and its relationship to the study		
Comm	ents:		
III.	Methodologic (Quantitative)		+
	a. Purpose of the study		
	b. Type of research design and appropriateness for the study.		
	c. Identify the independent and depend variables		
	d. Description of the sample. Include accessible and target populations,		
	characteristics of the population to which the findings have been generalized,	,	
	sample size and how were they recruited, and type of sampling design		
	e. Data collection. Include how variables were operationalized, and reliability a	and	
	validity of instruments		
	f. Type of statistical analysis used and appropriateness for answering the resear	ch	
	question. Include why or why not you think this test is appropriate.		
	g. Discuss threats to internal and external validity. Include personal opinion of		
	alternative approaches that could be used.		
TT 7	Maka 1-12- (O24-4)		
IV.	Methodologic (Qualitative)	han	
	a. Describe the setting and was it appropriate for this type of study. Could anot setting have used?	ner	
	setting have used? b. Clearly describe the phenomenon of interest		
	c. Describe data collection and appropriateness of this method		
	d. Sample description. Include accessible and target population, characteristics	of	
	the population to which the findings have been generalized, sample size and		
	recruitment, saturation, and type of sampling design.		
	e. Identify if triangulation was used and discuss		
	f. Discuss types of evidence obtained to support the credibility, transferability,		
	dependability, and confirmability of the data, the analysis, and the interpretat	ion	
Comm			

III.	Ethical					
	a. Discuss any ethical violations	ļ				
	b. Discuss ethical dilemma's impact on the problems regarding scientific merit of	ļ				
	the study as well as on the subjects' well-being	ļ				
	c. Identify protection of human rights	ļ				
Comme	nts:	ļ				
		ļ				
		ļ				
***	T					
IV.	Interpretive	ļ				
	a. Discuss important and significant results. Do they agree or disagree with these					
	results? Why or why not?	ļ				
	 Discussion of whether the interpretations of the researcher were consistent with the results. Include limitations of the research. 	ļ				
	c. Discuss the support or rejection the hypothesis and why or why not	ļ				
	d. Discuss generalizations made that are not warranted on the basis of the sample	ļ				
	used	ļ				
	e. Discussion of implications of the research for nursing practice, nursing theory,	ļ				
	or nursing research. Include the appropriateness given the study's limitations?	ļ				
	f. Discuss the researcher's recommendations for practice or future studies.	ļ				
Comme	1	ļ				
		ļ				
		ļ				
		ļ				
V.	Presentation & Stylistic	ļ				
	a. Discuss adequacy of the study and whether or not there was enough detail to	ļ				
	permit a thorough critique	ļ				
	b. Identify if report is well written and grammatically correct	ļ				
	c. Identify if report is well organized or confusing	ļ				
	d. Identify author's overt biases?					
	e. Discuss whether or not the title adequately captures key concepts and the	ļ				
Comme	population under investigation	ļ				
Comme	its.	ļ				
		ļ				
		ļ				
		ļ				
		ļ				
VI.	Summary	ļ				
	a. Compile a brief summary of what has been discussed in this paper	ļ				
	b. Discuss personal opinion of what they think about this research article	ļ				
Comme	nts:	ļ				
		ļ				
		ļ				
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VII.	Writing Style					
Comme	nte:					
Comme	110.					

Appendix B

	NURS 4100 Research Article Critique Peer Evaluation									
Yo	Your Group Subject:									
As	sign up t	to 10 points	s for each f	actor by tea	am memb	er, <u>includin</u>	g yourself.			
Us	e the foll	lowing crit	erion scale	as a guide f	for your e	valuation.				
				utral		gree	Strongly Agree			
	1	2	3	4	5	6	7	8	9	10
							Grou	ıp Member	's	
Ke	y Behavi	iors								
Came prepared by reading assigned article and reviewing rough draft										
2. Carried fair share of the workload										
Was respectful of other ideas and opinions; stayed positive and open-minded										
4.	4. Communicated with the group (gave constructive feedback and input, listened; alerted to problems)									
5.	5. Kept group focused and moving toward goals (e.g., summarized, evaluated, coordinated)									
				Т	TOTALS					

Comments:

Appendix C

Evaluation of the Peer Review Process

1.	Did you feel that the group work was beneficial in developing your critique?
2.	What was the most beneficial thing that you liked about the group work?
3.	What was the least beneficial thing that you did not like about the group work?
4.	What suggestions can you give that would have improved the group process?