EXPLORING THE ROLE OF PEER FEEDBACK IN TEACHING AND LEARNING:
FOCUSING ON PHARMACY EDUCATION

by

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(Under the direction of Ikseon Choi)

ABSTRACT

There has been increasing efforts in healthcare education to prepare students to be reflective practitioners. The Accreditation Council of Pharmacy Education (ACPE), recognizes that being able to reflect is a key element in preparing pharmacy professionals to meet the challenges of a dynamic healthcare environment. Although peer assessment and feedback has been used in clinical education to aid in student reflection; limited evidence-based research on peer feedback exists in pharmacy education. This dissertation explores the pedagogical benefits of peer feedback as an instructional strategy, to facilitate reflective thinking among pharmacy students.

This dissertation consists of three journal-type manuscripts. The first manuscript (Chapter 2) describes a conceptual framework, presents the factors impacting effectiveness of peer feedback, and provides design guidelines for educators and instructional designers to design effective peer feedback activities. The second manuscript (Chapter 3) uses an explanatory-sequential mixed-methods design to gauge pharmacy students’ perceptions of and attitude towards peer feedback in a pharmacotherapy course. The research on factors impacting effectiveness of peer feedback in Chapter 2 laid the foundation for the construction of the survey used in Chapter 3. The survey data, and data from semi-structured interviews revealed,
perception of competency, the perceived value of peer feedback, interrelationship among peers, and a safe and trusting environment are important determinants of students’ willingness to participate in peer feedback. The third manuscript (Chapter 4) presents a study that explores the pedagogical benefits of peer feedback by designing, developing, and implementing a peer feedback activity to facilitate reflective practice among pharmacy students. The conceptual framework and research on peer feedback in Chapter 2 laid the groundwork for the design of the peer feedback activity in Chapter 4. This study used a mixed-methods approach to investigate whether there was a relationship between effectiveness of peer feedback and reflective thinking scores among students. No significant relationship was found between perceived effectiveness of peer feedback and reflective thinking scores among students. Although we had limited data, important lessons were learned on the design, development, and implementation of peer feedback activities. The dissertation concludes with limitations and future research directions in Chapter 5.

INDEX WORDS: Peer feedback; Reflective practice; Instructional design; Pharmacy education
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DEDICATION

This is dedicated to my parents, Subasini and Ambaresh Panda, and to my uncle Biswambhar Panda, for their unwavering support and encouragement. To my kids, Neal, Nevee, and Norah for their unconditional love. Finally, to my husband Deepak, for his love, support, and time that he has invested with me into this degree.
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CHAPTER 1

INTRODUCTION

Learning to reflect is an essential skill for all clinical practitioners (Bernard, Gorgas, Greenberger, Jacques, & Khandelwal, 2012; Epstein, 1999). With the change in the role of pharmacists, they are not only involved in the dissemination of drugs, but are routinely engaged in the drug therapy decision-making involving patient care. This change in role of pharmacists has the potential to positively impact both the humanistic and economic dimensions of drug therapy issues by saving patient lives as well as healthcare costs (Bootman, Harrison, & Cox, 1997; Ernst & Grizzle, 2001). To enable pharmacists to take up the responsibilities of direct patient care, and resolve the drug therapy problems, pharmacists need to be trained to think critically (Cisneros, 2009), reflect on their experiences (Droege, 2003), and be able to work with a team of healthcare professionals (Wilson, Palmer, Levett-Jones, Gilligan, & Outram, 2016). Unfortunately, pharmacy schools across the country are still relying on didactic methods to train students (Roth et al., 2014), which does not effectively prepare students for real-world problem solving. Training students to become reflective practitioners requires a different approach of teaching (Droege, 2003).

Active learning methods such as Problem-Based Learning (PBL) and Case-Based Learning (CBL) are increasingly being used in pharmacy curriculum in an effort to help students become reflective practitioner (Cisneros, Salisbury-Glennon, & Anderson-Harper, 2002; Dupuis & Persky, 2008). PBL, first implemented in medical education (Donner & Bickley, 1993), is one of the teaching approaches consistent with training healthcare professionals as reflective practitioners because of its focus on critical thinking, problem solving, and collaborative learning.
(Droege, 2003). Based on cognitive science and pedagogy (Fisher, 1994), instructors play a limited role in PBL and allow students guide the discussion to help develop critical thinking, problem-solving, and self-directed learning (Srinivasan, Wilkes, Stevenson, Nguyen, & Slavin, 2007). CBL is another active learning strategy, in which a case is placed as context to promote authentic learning (Dupuis & Persky, 2008). CBL requires advanced preparation on the part of the learner and promotes a more structured approach to problem solving (Srinivasan et al., 2007). Unlike PBL, facilitators play a major role in CBL by guiding discussion to cover main learning objectives (Dupuis & Persky, 2008; Srinivasan et al., 2007). Both PBL and CBL are found to be more effective than lecture-based instruction in helping students develop active and reflective learning (Bentley, 2001; Droege, 2003).

Even though reflective thinking has been defined in many ways by researchers, general themes emerge in terms of definition and assessment of the quality and levels of reflective thinking. John Dewey (1933) is credited with distinguishing reflection from other types of thinking, which he defined as “active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further consideration to which it tends” (p.9). Moon (1999) considers reflection as “a form of mental processing with a purpose and/or anticipated outcome that is applied to relatively complex or unstructured ideas for which there is not an obvious solution” (p. 23). Moon (1999) formed a hypothetical model by synthesizing theories of cognitive structure, stages and approaches of learning and Piaget’s theory of accommodation and assimilation which emphasizes the role of reflection in learning in five stages from surface to deep learning (noticing, making sense, making meaning, working with meaning, and transformative learning). Reid (1993), considers reflection as an active process that goes beyond the experience itself and defines reflective
thinking as “a process of reviewing an experience of practice in order to describe, analyze, evaluate and so inform learning about practice” (p.305). All these definitions of reflection suggest reflection as a mental process that is activated past experiences to solve complex, non-routine and authentic problems.

Schön (1987) considered students as ill equipped to face the challenges of the ever-changing world of practice, and suggested that reflection can fill in the gap for practitioners to continue develop their professional skills. Thus, Schön (1983) introduced the term “reflective practitioner” to identify an individual who uses reflection as a tool to improve his or her professional practice. This interpretation of reflection focuses on the nature of reflective thinking and emphasizes on the importance of reflection as a skill on professional practice and development. Schön (1987), distinguished between two types of reflection such as reflection-in-action and reflection on-action to emphasize that students learn both during and after an action. Reflection-in-action occurs during the professional practice (Schön, 1987). In reflection in-action, for example, students and professionals are mindful and continually self-monitor while applying their knowledge and past experiences in evaluating a complex and unique clinical situation. For example, during professional practice, pharmacists engage in reflection-in-action when they encounter complex patient care challenges requiring them to think on their feet and employ their past experiences and skills to solve problem. Reflection on-action on the other hand occurs retrospectively after the completion of the action (Schön, 1987). During reflection-on-action, practitioners look back at the task and the process, analyze and evaluate the different aspects of their actions. This process enables practitioners to look back and critically evaluate their actions to improve future outcomes (Tsingos, Bosnic-Anticevich, & Smith 2014). A structured reflective practice such as peer feedback could help improve practice among
pharmacy students and professionals. Experiences in structured peer feedback activities could promote life-long learning and metacognitive awareness by encouraging students to reflect during and after the process of peer feedback which may enable them to make positive changes on similar subsequent activities.

Reflection in clinical context has been defined as a “cognitive process in which new information and experiences are integrated into existing knowledge structures, and mental models, resulting in meaningful learning” (Bernard et al., 2012). Thus, reflection works by restructuring or assimilating new concepts, skills, knowledge, and or values to pre-existing knowledge structures (Branch & Paranjape, 2002). As the new role of pharmacists’ demand direct patient care (Droege, 2003), pharmacists will be required to make complex drug therapy decisions on the spot. Reflection can be an important tool to make sense of these complex situations by helping professionals reflect on their relevant past experiences to process the new information encountered and transfer the learning to the new situation (Droege, 2003; Epstein, 1999).

Different methods have been used to facilitate reflective practice in various fields. For example, reflective journaling (Bouldin, Holmes, & Fortenberry, 2006; Fischer, Haley, Saarinen, & Chretien, 2011), blogging (Dunne, & Ryan, 2016; Wright, & Lundy, 2012) and portfolios and e-portfolios (Goodyear, Bindal, & Wall, 2013; Plaza, Draugalis, Slack, Skrepnek, & Sauer, 2007), have been at the forefront of published literature. Chang & Lin (2014) in their study investigated the effects of using reflective learning e-journals as a learning aid in English as foreign language (EFL) course. The researchers found that students who used reflective learning e-journals outperformed their counterparts in the control group who did not use the journals. The authors also reported that students using the reflective learning e-journals found it to be a very
helpful tool to review the course content and prepare for exam, which was a result of students becoming more aware of their own knowledge construction process (Chang & Lin, 2014).

Boud (2001) and Moon (1999) believed reflective journaling to be a successful strategy that helps learners develop critical thinking skills. In a study by Xie, Ke and Sharma (2007), Moon’s model (1999) has been used to explain the relationship between peer feedback and blogging on college student’s reflective thinking. In their study, the authors investigated the interaction effect of peer feedback and blogging on college student’s reflective thinking skills and their learning approaches. In developing the hypothetical model, Moon (1999) derived from Mezirow (1991) work, and in agreement with him, Moon believes that reflective thinking can be facilitated when worked together, especially when worked with “critical friends” who can promote reflective thinking skills.

Hattie and Timperley, (2007) defined feedback as “information provided by an agent (peer) regarding aspects of one’s performance or understanding” (p. 81). Peer feedback could help students by identifying the gap between their actual and desired performance (Archer, 2010), as well as help them to critically evaluate their own work by reviewing and critiquing their peers’ work (Tsai, Lin, & Yuan, 2002). Despite of these benefits of peer feedback, little research has been done in clinical fields to use peer feedback as a pedagogical technique to facilitate reflective practice. Thus, my dissertation includes design, development, and implementation of a peer feedback activity to explore peer feedback as an instructional tool in facilitating reflective thinking among second-year pharmacy students. Understanding the current challenges and needs in peer feedback practices may contribute towards optimizing the educational value of peer feedback. Further, upon completion this study will add to the literature
on providing valuable learning experience through peer feedback in clinical settings and may help prepare students for future careers.

**Dissertation Overview**

This dissertation is comprised of five chapters. This dissertation consists of three manuscripts that are under preparation. The first paper (Chapter 2), *How Peer Feedback Works: A Conceptual Framework to Maximize the Benefits of Peer Feedback*, attempts to develop a conceptual framework of peer feedback by reviewing relevant literature on the factors that play a role in impacting the effectiveness of peer feedback. The paper explores theoretical foundations of peer feedback and presents a general framework of the cognitive and metacognitive processes involved in peer feedback to show how both the feedback provider and receiver benefit from engaging in peer feedback activities. Finally, instructional recommendations are discussed to help guide researchers and instructional designers to design effective peer feedback activities to maximize the educational value of peer feedback.

The second paper (Chapter 3) is *Exploring Peer Feedback Strategies to Promote Positive Attitude towards Peer Feedback among Pharmacy Students in a Pharmacotherapy Course*. Although, there has been research in pharmacy education to gauge the perceptions and attitudes of pharmacy students toward peer feedback and assessment, there is limited data to show what factors impact student participation in peer feedback activities. The purpose of this study was to investigate pharmacy students’ perceptions and attitude towards various aspects of peer feedback practices and identify the issues that will encourage or discourage their participation in peer feedback activities. The present study goes beyond perceptions to identify factors that will encourage or deter student participation in peer feedback activities. An explanatory sequential mixed-method approach with a 20-item electronic survey and semi-structured interviews were
used to collect data from students enrolled in a required pharmacotherapy course. Seventy-five participants (53%) completed the survey and five participants were interviewed. Interviews were analyzed using a constant comparative approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990) and descriptive statistics are provided from the survey. Results indicate that perceptions of competency of the self and peers, the perceived value of peer feedback, and interrelationship among peers are important determinants of students’ willingness to participate in peer feedback. Education and training in peer feedback techniques, as well as opportunity to practice the skill can help students promote positive attitude towards peer feedback.

The third paper (Chapter 4), *Peer Feedback as a Medium to Facilitate Reflective Practice Among Pharmacy Students in a Case-based Learning Environment*, presents the design, development, and implementation of a peer feedback activity in a case-based learning environment, and explores the relationship between effectiveness of peer feedback and reflective thinking among participants. This study was conducted with second-year pharmacy students and employed a mixed-methods research approach, incorporating a correlational design and a constant comparative research approach. Peer feedback evaluation data was collected using Effectiveness of Peer Feedback scale in three rounds of peer feedback by students. The data on students’ reflective thinking was collected using Reflection-in-Learning Scale (RLS), developed by Sobral (2000). Pearson correlation was conducted on quantitative data and semi-structured interview data from five participants were analyzed using constant comparative method. Although limited data made it difficult to derive concrete conclusions on the relationship between peer feedback and reflective practice skills of pharmacy students, valuable lessons were learned to improve the design, delivery, and evaluations of peer feedback activities.
Finally, Chapter Five includes a summary of key ideas from the three manuscripts. As this dissertation serves as a first step towards exploring peer feedback as an instructional strategy to aid in reflective thinking skills of pharmacy students; this chapter also describes the limitations and suggestion of future research. Moreover, this chapter outlines the implications of our conclusions for healthcare education in general and specifically for reflective practice efforts in pharmacy curriculum.

The Institutional Review Board (IRB) application was approved in fall of 2015 and pilot data was collected the following spring semester (2016). All the data for the dissertation was collected in the Fall of 2016, and were analyzed in fall 2016 and spring 2017.
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CHAPTER 2

HOW PEER FEEDBACK WORKS: A CONCEPTUAL FRAMEWORK TO

MAXIMIZE BENEFITS OF PEER FEEDBACK

1 Mishra, S. D, & Choi, I. To be submitted to Journal of Computing in Higher Education.
Abstract

Even though there is a consensus among educators and researchers on the value of peer feedback as an instructional strategy, the conditions that play a role in influencing the effectiveness of this pedagogical technique still need to be investigated. This paper explores theoretical foundations of peer feedback, and builds a conceptual framework explaining the cognitive and metacognitive processes involved in peer feedback. Further, relevant research literature is synthesized to identify factors influencing the effectiveness of peer feedback practices. Understanding these factors impacting the effectiveness of peer feedback will help optimize the educational value of peer feedback. Finally, instructional guidelines are presented to help researchers and instructional designers design effective peer feedback activities.

Keywords: Peer Feedback, Instructional guidelines, Factors impacting peer feedback, cognitive and metacognitive processes in peer feedback
**Introduction**

Current trends in educational practices strive for making classroom learning as practical as possible to mirror professional workplace. Providing and receiving feedback is viewed as an integral part of many professional practices (Eraut, 2004; Gordon, 2003; Van der Pol, Van den Berg, Admiraal, & Simons, 2008). Hattie and Timperley, (2007) defined feedback as “information provided by an agent (peer) regarding aspects of one’s performance or understanding” (p. 81). Formative peer feedback has been found to be an effective tool in promoting self-assessment skills (Sluijsmans, Brand-Gruwel, Van Merriënboer, & Bastiaens, 2002; Topping, 1998), writing skills; (Cho & Schunn, 2007; Lundstrom & Baker, 2009) and learning outcomes among students (Tsai, Lin, & Yuan, 2002; Xiao & Lucking, 2008). In medical context, peer feedback has been primarily used to study communication skills (Chou, Masters, Chang, Kruidering, & Hauer, 2013; Hulsman, Peters, & Fabriek, 2013) and professionalism among medical students (Camp et al., 2010; Finn, Sawdon, Clipsham, McLachlan, 2009; Nofziger, Naumburg, Davis, Mooney, & Epstein, 2010). Incorporation of peer feedback practices as a pedagogical approach among preservice teachers was found to promote deeper learning (Lynch, McNamara, & Seery, 2012) and professional practice by enhancing collaboration and reflection (Wilkins, Shin, & Ainsworth, 2009). In business school, peer feedback has been found to help promote self-awareness skills to more accurately reflect leadership competencies among students (Mayo, Kakarika, Pastor, & Brutus, 2012) as well as provide an opportunity to work well in team environments (Brutus & Donia, 2010). Although there is a consensus among educators on the value of peer feedback in many professional fields, there are inconsistencies in the pedagogical practices involving peer feedback. Further, existing literature on peer feedback is
inconclusive in specifying how peer feedback could foster cognitive and metacognitive gains among learners and ultimately prepare them for their future careers.

This paper builds on evidence from literature to conceptualize peer feedback and describe cognitive and metacognitive processes involved in peer feedback in order to increase our understanding of feedback practices as well as maximize the pedagogical benefits of peer feedback. The overall goal of this paper is to conceptualize peer feedback process and discuss how peer feedback could be an effective tool both to promote reflection and self-assessment skills among students. This paper explores theoretical foundations of peer feedback, builds a conceptual framework explaining the process of peer feedback, synthesizes relevant literature to identify factors influencing peer feedback activities, and finally offers instructional guidelines to design effective peer feedback activities. Understanding the instructional needs and benefits of peer feedback may contribute towards optimizing the educational value of peer feedback. Further, this study will add to the literature on providing valuable learning experience through peer feedback in higher education and may help prepare students for their future careers.

**Theoretical Foundations of Peer Feedback**

Several theories support various aspects of peer feedback practices. In this paper, we focus on social constructivist principle as the underlying foundation of peer feedback. Peer feedback, the learning element of peer assessment is inherently social in nature (Van Gennip, Segers, & Tillema, 2010) in which students work together and are actively engaged in the management of their own learning (Liu & Carless, 2006). Peer collaboration and feedback are essential components of collaborative learning principles as students collaborate to work towards a shared goal and construct new knowledge by exchanging feedback with each other. In learner-
centered pedagogy, where students play a central role, peer feedback could be an important component of collaborative learning activities.

![Venn diagram](image)

**Figure 2.1. Theoretical foundations of peer feedback**

**Social constructivist theory**

Social constructivism uniquely emphasizes the importance of social context in learning and claims that individuals construct and modify their own knowledge by interacting, sharing, negotiating, and on occasion learning from more experienced individuals (Liu, Lin, Chiu, & Yuan, 2001). Peer feedback activities draws on constructivism where students can learn through sharing of ideas; engage in various cognitive processes while exchanging feedback on each other’s work, and thereby co-constructing knowledge. This dual focus on learner and social interaction is the essence of social-constructivist principle (Vygotsky, 1978), which underlines social interaction and negotiation of meaning as the basis for the construction of knowledge. Peer feedback could be viewed as an extension of the concept of Zone of Proximal Development (ZPD) which emphasizes two distinct levels in the learner, the actual developmental level determines what the learner is capable of doing on his own and the potential developmental level
determines what the learner can achieve with the help of an expert or more capable peer (Vygotsky, 1978). Peer feedback activities can promote learning in students when advanced students can scaffold and help their peers move though the levels by providing constructive feedback. Although the concept of ZPD highlights on the role of ‘more able peers’, research in the field of peer feedback have demonstrated that even when two novice peers are paired together in a collaborative learning environment, they still scaffold each other’s learning (De Guerrero & Villamil, 2000). Going a step further, Strijbos, Narciss, & Dünnebier, (2010) argued that the feedback provider’s current level of competence does not negatively affect the effectiveness of the feedback. Strijbos and his colleagues found that, feedback provided by a low competent peer is equally effective provided that a well-designed feedback criterion is used by all students to provide feedback (2010). Since students involved in peer feedback activities engage in various cognitive and metacognitive processes, researchers agree that, engaging in peer feedback activities are beneficial for students and both the feedback provider and receiver could move through and advance their ZPD irrespective of their competence levels (Lin, Liu, & Yuan, 2001; Strijbos et al., 2010). Social interaction plays a major role in facilitating learning, and peer feedback could be an effective means of fostering shared meaning making and co-construction of knowledge among individuals.

**Collaborative learning theory**

Social interactions are key to collaborative learning (Kreijns, Kirschner, & Jochems, 2003), and peer feedback, an inherently social process in which learning takes place through sharing of information (Van Gennip et al., 2010) can help facilitate successful collaborative learning. Collaborative learning described as a coordinated effort towards constructing shared understanding through interaction with others (Roschelle & Teasley, 1995) is founded in
constructivist epistemology and involves pairs or groups of students working together to build consensus while still responsible for their individual learning (Panitz, 1999). Thus, the focus on constructing shared understanding and individual as well as collective responsibility of students towards learning provides the theoretical framework that underpins the concept of peer feedback.

Decades of research have shown that peer feedback could be an effective strategy to facilitate collaborative learning among students. In a recently published research, Kirschner, Kreijns, Phielix, & Fransen (2015) studied the effects of a peer feedback and reflection tool on students’ social and cognitive behavior and social and cognitive group performances. Results showed improved social and cognitive behavior, convergence of self and peer assessment, and enhanced interaction and team development among students using the tools. Collaborative learning environments such as peer feedback activities encourages students to interact with each other, to share information, and promotes interdependence as students work together towards the same goal (McGourty, Dominick, & Reilly, 1998).

**Learner-centered pedagogy**

The current movement of learner-centered pedagogy and its pervasiveness has highlighted peer feedback as a learning activity in which students are at the center of activity. Learner-centered pedagogy signifying the need for progressive independence of the learner has garnered much consensus in higher education (Trigwell, Prosser, & Waterhouse, 1999). Learner centered pedagogy draws on constructivism, which assumes that knowledge is not external to the knower, and is rather constructed by the individual learner through interaction with others and by reflecting on one’s own individual experiences (Jonassen, 1993). Peer feedback activities allow a shift in the learning environment as teachers are no more the only source of knowledge. These activities foster active learning among students by providing opportunities for students to engage
in dialogue with peers by exchanging and clarifying feedback. In reciprocal peer feedback activities students, may be allowed to choose their peers to work with, construct feedback criteria to evaluate effectiveness of feedback and negotiate meaning by collaborating with their peers. Peer feedback activities in collaborative learning environment encourage students to take ownership of their learning and thus can help foster autonomy and independence in the learner (Ten Cate, Snell, Mann, & Vermunt, 2004; Yang, Badger, & Liu, 2006).

Figure 2.2: A conceptual framework for peer feedback
A Conceptual Framework for Peer Feedback

Previous research in the field leads to the proposed framework (Figure 2) in which the process of effective peer feedback can be considered. First, it is argued that there are several key factors that undermine the effectiveness of peer feedback; and they need to be considered while designing a peer feedback activity. These key factors are discussed in the next section. Secondly, it is argued that effective peer feedback activities could help stimulate cognitive and metacognitive engagement among students resulting in enhanced reflective practice, self-assessment, and learning outcomes. As the diagram of the framework (Figure 2) indicates, reciprocal peer feedback process is considered in the light of various theories and concepts, which sheds light on different aspects of peer feedback. Thus, the underlying conceptual rational of the framework is that peer feedback process allows students to engage in various cognitive activities while critically evaluating peer’s work or the feedback received by peers (Yu and Wu, 2013).

Process of Peer Feedback

Process of providing peer feedback. The first step in the peer feedback process from a feedback provider’s standpoint is to understand the content and objective of peer’s work. In the next step, the feedback provider evaluates the strengths and weaknesses of peer’s work. During this evaluation process the provider also self-assess their own work against the criteria as well as against their peer’s work. In composing feedback, the students articulate their understanding in the light of their knowledge and past experience. It is argued that engagement in these cognitive processes leads to reflection on one’s own work and peer’s work as well as promote self-assessment skills.
**Process of receiving peer feedback.** Similarly, from a receiver’s standpoint, peer feedback process does not stop after the feedback is received, but it stimulates students to critically analyze, reflect and finally act upon the received feedback (Gibbs & Simpson, 2004; Hattie & Timperley 2007; Prins, Sluijsmans, & Kirschner, 2006). The first step after getting the feedback on the part of the receiver is to critically analyze the received feedback. This critical analysis of the feedback helps the receiver to decide which feedback to use and which ones to discard. In the next step, the receiver reflects on own work and revises it by incorporating feedback received from peer.

**Reflection-in-action and reflection-on-action.** One of the key benefits of using peer feedback in a classroom environment is to provide students with the opportunity to engage in reflective practice. Schön, (1983) distinguishes between two kinds of reflection, reflection-in-action, and reflection-on-action, both of which could be experienced by students in a peer feedback activity. Reflection-in-action, according to Schön, (1983) occurs during the learning process, in which students monitor and modify their actions while engaged in the learning activity. This type of reflection implies higher competency level of the individual as they are able to think and modify their actions while it is happening (Hatton & Smith, 1995). While reviewing peers’ work or critically evaluating the feedback by peers, learners engage in reflection-in-action, in which they constantly compare their own work with that of peers’ and simultaneously assess the strength and weaknesses of the feedback received. Reflection-on-action on the other hand occurs after the learning process and involves evaluation and systematic planning to improve in future activities. In peer feedback reflection-on-action occurs after the exchange of feedback, as learners evaluate the strength and weaknesses of the feedback received and reflect on their own work after assessing their peers’ work. It promotes life-long learning and metacognitive
awareness by encouraging students to reflect back on the entire process of peer feedback, which may enable them to make positive changes on similar subsequent activities. Thus, reflection works by restructuring or assimilating new concepts, skills, knowledge, and or values to preexisting knowledge structures (Branch & Paranjape, 2002); and peer feedback could be an effective medium to promote reflection among students.

**Outcomes of Peer Feedback.** Reflective practice and self-assessments along with improvements in learning are argued to be the anticipated outcomes of peer feedback process.

The importance of reflecting on practice to inform future behavior has been well documented in the literature (Boud & Walker, 1998, 1984; Reid, 1993; Schön, 1987). Researchers have used various techniques to foster reflective skills among learners including reflective journaling (Boud, 2001; Chang & Lin, 2014), questioning (Malthouse, Watts, & Roffey-Barentsen, 2015), and critical incidence method (Branch, 2005). Although these techniques have been used successfully, many researchers have argued for a need to guide students to reflect on their learning by emphasizing the roles of supervisors, mentors, and peer groups for effective reflection (Kori, Maeots, & Pedaste, 2013). Moon’s (1999) work highlighted the importance of working with others and explains the relationship between peer feedback and reflective thinking to some extent. The author suggested working with “critical friends”, who could ask questions and facilitate a reflective exploration to help students improve their thinking from a surface to deep level and can promote reflective thinking skills (1999).

Self-assessment is considered an essential skill for effective learning in higher education and to develop lifelong learning among students (Boud & Falchikov, 1989). It also helps students take responsibility of their own learning by allowing them to be engaged in the assessment process (Taras, 2001). Although research on self-assessment has been gaining attention as an
important phase of self-regulated learning (Zimmerman, 2008), there is still a lack of integration of self-assessment in the assessment and evaluation process in higher education, resulting in general inaccuracies in self-evaluations (Chang, Chang, & Yu, 2010). Nicol and Macfarlane-Dick (2006) suggest providing students with the opportunity to practice self-evaluation by monitoring the gap between their expected and actual outcomes. According to Boud, Cohen, & Sampson (1999), peer feedback could be an effective medium to strengthen their self-assessment skills by providing and evaluating peer feedback against set criteria and transferring these skills to evaluate their own work.

**Key Factors Influencing Peer Feedback Practices**

Research indicates, the abovementioned outcomes however are undermined by various factors that impact the effectiveness of peer feedback. Some of the key factors identified in the literature are goal setting, duration of activity, inclusion of criteria, training in developing constructive feedback, credibility of source, quality of feedback, and the relationship between peers. These factors are presented in two categories: Teacher/Instructional factors and Learner/Individual factors (summarized in table 1). The instructor essentially controls the teacher/instructional factors while designing a peer feedback activity, whereas the students are primarily responsible for the learner/individual factors. These key factors are discussed in the subsequent subsections.

**Teacher/Instructional Factors**

**Goal setting.** Defining the goals of the activity at the beginning allows students to see the discrepancy between their current learning and what they want to achieve which is essential in working towards reducing the gap (Archer, 2010; Hattie & Timperley, 2007; Kamp, Dolmans, Van Berkel, & Schmidt, 2013). Awareness of the goal also helps students seek and get feedback
that are directed towards attainment of that goal (Hattie & Timperley, 2007). Kamp et al. (2013) investigated the combined effect of peer feedback and goal setting on the individual contributions of students in a PBL environment. A focus group interview with the students revealed that goal setting and reflections are important conditions for peer feedback to be effective and explaining the purpose and goal of the feedback could help improve peer feedback practices (Kamp et al., 2013). Research by Archer (2010) indicates that setting goals allows students to reflect and self-monitor their progress which in turn ensures the effectiveness of peer feedback. Stressing on self-regulation, Prins et al. (2006), took an interesting take on the need for goal setting in the feedback process among general practitioners in training. The authors advocated for the receiver to play an active role in the process by asking for specific feedback and their explanations and suggestions, thereby essentially taking charge of getting the feedback they need to improve their performance (Prins et al., 2006). Corroborating the researchers’ recommendations Gielen, Tops, Dochy, Onghena, & Smeets, (2010a) reported that using a question form by students to indicate their needs for specific feedback was found to be helpful. In a review of research exploring the meaning of feedback Hattie and Timperley (2007) emphasized the role of goal setting and specific, directed feedback in the effective implementation of peer feedback practices. According to the authors, feedback cannot bridge the gap between current and desired understanding in the absence of specific goals. Having specific goals requires feedback to be more directed towards attainment of the goal and could help reduce the discrepancy between current understandings of students and their desired goals (Hattie & Timperley, 2007). Thus, the instructors can help students by clarifying the goals of the activity, so that students can see their current learning states and anticipate what they will be able to achieve from the process.
Duration of peer feedback activity. The duration of collaborative peer feedback activity also has an impact on the effectiveness of the peer feedback (Kamp et al., 2014). The researchers combined reflection conditions and goal settings with peer feedback to study if it has any influence on students’ contribution within tutorial groups. Their results indicated peer process feedback combined with reflection conditions and goal setting did not improve the quality of student contribution to their tutorial groups, which was attributed to the shorter length of collaborative peer feedback activity (Kamp et al., 2014). In another study, Phielix et al., (2011) researched the effectiveness of peer feedback and reflection tools to enhance group performance in a computer supported collaborative learning environment and concluded that a longer time period is necessary to see stronger effects of the tools on the social and cognitive behavior of the students. Tsai et al., (2002) also found that time spent in peer feedback activity does impact the effectiveness of peer feedback practice. The researchers asserted that two rounds of peer assessment did not provide any significant difference in performances and concluded that adequate time is required to observe the effects of collaborative peer activity (Tsai et al., 2002).

Peer feedback activities requires students to engage in complex cognitive processes such as monitoring and assessing their own and peers’ performances as well as evaluating and reflecting on the feedback received, thus necessitating sufficient time to observe effects of such activities (Phielix et al., 2011). Therefore, while designing the activity instructors should be mindful of the duration of the activity to be able to see the positive impact of peer feedback.

Inclusion of feedback criteria. Involving the students in constructing peer feedback criteria has been linked to promoting student engagement in learning process, in addition to the benefits of skill development associated with giving and receiving constructive feedback (Heylings & Stefani, 1997). Although in some cases students are provided with rubrics for
constructive feedback, students are largely excluded from the academic discourse concerning the
construction of the criteria, which undermines the value of their feedback marking (Purchase,
2000; Orsmond, Merry, & Reiling, 1996). Further, research findings also suggest that although
there is a positive correlation between peer and teacher marking, they often evaluated different
elements as they interpreted the assessment criteria differently (Cheng & Warren, 2005; De Grez,
Valcke, & Roozen, 2012). In one of the first studies on peer feedback marking in clinical settings,
Heylings and Stefani (1997) conducted a study on the application of peer feedback marking
strategy (Falchikov, 1995) in a large anatomy department with 154 medical students. Students
and staff negotiated the assessment criteria used for the feedback marking prior to engaging in
the activity. The evaluation results indicated a significant majority of students reporting an
increase in quality of their work as a result of gaining an insight into the process of assessment
through their participation in constructing it (Heylings & Stefani, 1997). Orsmond et al., (1996)
also found positive results in a study involving applied science undergraduate students. The
researchers investigated the use of exemplars and formative feedback in self and peer assessment
of students in which the marking criteria were constructed by the students. Although, Orsmond et
al., (1996) found no significant differences between the scores assigned by peers and instructors,
the results indicated that participation in the construction of criteria helped student gain better
understanding of the requirement and purpose of the assignment, which in turn enhanced their
quality of learning.

*Training in developing constructive feedback.* Concerns regarding students’ own and
their peers’ capability to assess and provide constructive feedback is a common theme reported
in studies reporting perception on peer feedback and assessment (Burgess, Roberts, Black, &
Mellis, 2013; Cassidy, 2006). This inadequacy of skills in feedback has been attributed for the
most part to lack of training opportunities provided to students to learn constructive peer feedback techniques (Gielen et al., 2010a; Prins et al., 2006; van Zundert, Sluijsmans, van Merriënboer, 2010). Training is also imperative because students find it especially harder to provide negative feedbacks on their peers’ work without proper training on how to provide feedback (Sluijsmans, Brand-Gruwel, van Merriënboer, & Bastiaens, 2002). Sluijsmans, Brand-Gruwel, van Merriënboer, & Martens (2004) investigated the effects of training on peer assessment skills of student teachers. Using an experimental design, the researchers found that in general, students who received training on assessment skills were more capable in rating their peers’ work than the control group. However, the authors emphasized the need for adequate amount of time in training for peer feedback to be effective (Sluijsmans, et al., 2004). In a study, Burgess, et al. (2013) investigated the perceived ability of medical students in providing feedback to their peers using positive critique method in formative long case examinations. Although, the students had a one-hour training session prior to the formative examination forty-two percent of the participants reported having social discomfort especially when providing negative feedback on their peers’ work (Burgess et al., 2013). Although peer feedback practices are more and more prevalent in recent days, students are not explicitly trained how to provide feedback to their peers, thus directly impacting the quality of feedback and making the process unreliable and ineffective.

**Learner/individual factors**

*Credibility of source.* The issue of credibility of source for peer feedback stems from the research findings, which revealed qualitative differences in peer and expert feedback (Hovardas, Tsivitanidou, & Zacharia, 2014; Tsui & Ng, 2000; Yang et al., 2006). Expert feedbacks are valued because of their authority and experience (Tsui & Ng, 2000), whereas, peers lack
necessary domain knowledge which leads them to focus on inessential aspects while providing feedback to their peers (Cho & MacArthur, 2010; Gielen, Peeters, Dochy, Onghena, & Struyven, 2010b). In a study on English language learners in a Chinese university, Yang et al., (2006) researched the nature and impact of peer and expert feedback among students. The findings suggest that, students more often incorporate expert feedback as they perceive experts as ‘professional’, ‘experienced’, and ‘trustworthy’; whereas, peer feedback was most often ignored while making revisions, as students did not trust their peers’ judgments on their work (Yang et al., 2006).

Hovardas et al. (2014) studied quality of peer feedback among secondary school students and found significant differences between peer and expert feedback. Specifically, the research found that peers placed less emphasis on assessment of skills, provided fewer suggestions for change, and included more positive reviews in their peers’ work than experts (Hovardas et al., 2014). Tsui and Ng (2000) studied the roles of peer and expert feedback in revisions in writing among secondary school students learning a second language. In another study in the series, Cho and Schunn (2007), found that multiple peer reviews better help improve performance among students because such feedback is easier to understand and incorporate in revision than expert comments. In addition, expert feedback was misinterpreted more often whereas peer feedback induced more discussion regarding interpretation, which resulted in self-correction (Yang et al., 2006). Although expert feedback still serves important purposes, peer feedback could immensely help students in both improving their work as well developing feedback skills.

**Quality of feedback exchanged.** The quality of peer feedback is defined primarily in terms of their accuracy, reliability across feedback providers, and or comparison/concordance with expert feedback (Van Steendam, Rijlaarsdam, Sercu, & Van den Bergh, 2010).
### Summary of factors influencing peer feedback practice

Nelson and Schunn (2009) examined the relationship between various features (summarization, specificity, explanations, scope, and affective language) of received feedback and the likelihood of implementing feedback. The results indicated that understanding the

<table>
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<th>Factors</th>
<th>Claim</th>
<th>Evidence</th>
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<tr>
<td><strong>Teacher/Instructional Factors</strong></td>
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<tr>
<td>Goal setting</td>
<td>Lack of clear goals/direction undermines the value of feedback exchange.</td>
<td>(Kamp et al., 2014; Phielix et al., 2011).</td>
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<tr>
<td>Duration of Peer Feedback Activity</td>
<td>Shorter duration of peer feedback activity does not result in observable effects of feedback exchanged.</td>
<td>(Kamp et al., 2014; Phielix et al., 2011; Tsai et al., 2002).</td>
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<tr>
<td>Inclusion of Feedback Criteria</td>
<td>Students’ lack knowledge of feedback criteria negatively impacts the effectiveness of peer feedback.</td>
<td>(Cheng &amp; Warren, 2005; De Grez et al., 2012; Heylings &amp; Stefani, 1997; Orsmond et al., 1996; Purchase, 2000).</td>
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<tr>
<td>Training in Developing Constructive Feedback</td>
<td>Lack of or inadequate training in how to provide constructive feedback could hinder the effectiveness of peer feedback.</td>
<td>(Burgess, 2013; Cassidy, 2006; Gielen et al., 2010b; Prins et al., 2006; van Zundert et al., 2010).</td>
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<tr>
<td><strong>Learner/Individual Factors</strong></td>
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<tr>
<td>Credibility of Source</td>
<td>Skepticism towards competency of peers in providing constructive feedback could negatively impact the outcome of peer feedback activity.</td>
<td>(Hovardas et al., 2014; Tsui &amp; Ng, 2000; Yang et al., 2006)</td>
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<tr>
<td>Quality of Feedback Exchanged</td>
<td>Lack of accuracy, specificity, and justification in the feedback undermines the value of peer feedback.</td>
<td>(Gielen et al., 2010b; Nelson &amp; Schunn, 2009; Tseng &amp; Tsai, 2007).</td>
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<tr>
<td>Relationship between Feedback Provider and Receiver</td>
<td>Relationship between the feedback provider and receiver could impact the effectiveness of the feedback exchanged and the peer feedback activity.</td>
<td>(Bok et al., 2013; Chou et al., 2013; Eva et al., 2012; Sadler, 1998).</td>
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Table 2.1: *Summary of factors influencing peer feedback practice*
problem described in the feedback is an important factor for the receiver in implementing the feedback. Students found it more helpful if the feedback included a summary, the location of the problem, and potential solution to the problem. The findings of Nelson and Schunn (2009) also corroborate Tseng and Tsai’s (2007) findings that presence of explanations of feedback especially involving novice students could negatively impact the understanding of feedback and thereby discourage implementation. However, contrary to these findings, Gielen et al. (2010b) in examining the effectiveness of certain characteristics of the content and style of provided feedback found that the presence of justification (presence of explanations of remark) positively affected performances of students especially with lower pretest scores. The results also showed that the presence of accurate negative comments also impacted performance, although lower than justification indicating that it is more important for a feedback provider to provide justification rather than providing accurate negative comments on their peers’ work (Gielen et al., 2010b). The presence of justification in a feedback could be associated with the credibility of the source of feedback and therefore could impact implementation and subsequently performance of the students.

**Relationship between feedback provider and receiver.** Peer feedback requires interaction among students, and interrelationship between the assessor and assesses could determine the effectiveness of peer feedback (Bok et al., 2013; Chou et al., 2013). Bok et al. found that feedback seeking behavior of veterinary students with their supervisors was influenced by the duration of their relationships. Supervisors gained credibility when they spent time observing students during clinical performances and as duration of relationship increased, students became increasingly comfortable in seeking feedback (Bok et al., 2013). In a study with year 3 medical students with and without prior small-group relationships, students with prior relationships
provided more specific and corrective feedback to their peers on their communication skills (Chou et al., 2013). How feedback is received is as important as the strategies used to deliver them and responding to feedback is dependent on factors including confidence of the assessor, their previous experience in providing feedback and their fear of appearing unknowledgeable (Eva et al., 2012). This importance of personal and interpersonal factors of assessor and assesses requires creating a trusting environment that can help facilitate exchange of feedback (Sadler, 1998). A healthy social environment is imperative for effective exchange of peer feedback and thus relationship between feedback sessions provide and receiver could have important impact on the effectiveness of peer feedback practices.

**Instructional Guidelines & Practical Implications**

Researchers have recommended various instructional strategies to counter the impact of the above-mentioned factors influencing effectiveness of peer feedback. These strategies, discussed in the subsequent three sub-sections are grouped according to the suggested time of their implementation. Table 2 summarizes these instructional guidelines before, during and after the activity and provides the links between the factors influencing effectiveness of peer feedback and suggested instructional recommendations.

**Pre-Feedback Phase**

Providing quality, constructive feedback is central to peer feedback practices. Students are often not confident about their own competency provide feedback to their peers and are skeptical about their peers’ capability to provide feedback (Hovardas et al., 2014; Tsui & Ng, 2000). Training in providing constructive feedback, opportunity to practice, and guiding prompts prior to the activity is probably the most widely recommended instructional strategy to help students gain confidence and enhance the quality of peer feedback (Burgess et al., 2013; Cassidy,
Training is especially helpful for novice reviewers, to detect global flaws on structure and technique of peers’ work (van Streendam et al., 2010). Knowledge of the purpose and goal of peer feedback is another essential component that impacts the effectiveness of peer feedback activity (Kamp et al., 2014). Goal setting directs students towards specific feedback to improve performance and keeps them focused and engaged in the activity (Locke & Latham, 1984). Furthermore, involving students in creating feedback criteria has been found to help students gain insight into the goal and purpose of the feedback exchange and thus enhance the quality of feedback (Falchikov, 1995; Sluijsmans et al., 2004). Since credibility of the source of feedback is always a concern for students, having multiple reviewers has been recommended to achieve reviewer accuracy to help maximize the benefits of peer feedback (Cho & Schunn, 2007). Gielen et al., (2010a) found that using a question form by the receiver prior to the activity to indicate their need on specific aspects of their work improves the quality of peer feedback as well as peer feedback skills among students.

Individual relationships of students with each other are a persistent aspect of classroom environment, thus it is important to consider the role of interrelationship among the students and its potential impact on the effectiveness of peer feedback activity. Although anonymity is often touted as a solution to counter the impact of relationship dynamics, true anonymity is hard to obtain, especially in small classrooms. Further, anonymity undermines the authentic context of future work situations in real-world settings (Panadero, Romero, & Strijbos, 2013). Instructors and developers should instead strive towards establishing an environment of trust, which could enhance the acceptance of feedback among peers (Sadler, 1998).
Pre Feedback Phase

- Goal Setting
- Training in Constructive PF
- Inclusion of PF Criteria

During Feedback Phase

- Credibility of Source
- Relationship between Provider and Receiver

Post Feedback Phase

- Quality of Feedback Exchanged
- Duration of PF Activity

Clarification of the purpose and goals of peer feedback (Kamp et al., 2014; Locke & Latham, 1984)

Provision of rubric or feedback criteria (Heyling & Stefani, 1997; Orsmund et al., 2002)

Training and guiding prompts to develop constructive feedback (Hovardas et al., 2014; Tsui & Ng, 2000)

Provision of multiple reviewers (Cho & Schunn, 2007).

Provision of question form to indicate feedback needs on specific aspects of work (Gielen et al., 2010)

Establishing an environment of trust (Sadler, 1998).

Feedback must include a summary, identification and location of the problem, and suggestions on potential solution to the problem (Nelson & Schunn, 2009)

Feedback should include neutral, non-judgmental language (De Nisi & Kluger, 2000; Hattie and Timperley, 2007)

Feedback should be based on observation, task, and task performance and not on the individual (Branch & Paranjape, 2002; Schartel, 2012, De Nisi & Kluger, 2000)

Include praise-oriented advice (Nelson & Schunn, 2009).

Provision of opportunity to discuss and clarify the received feedback (Hovardas et al, 2014; Kamp et al., 2013)

Adequate duration of the peer feedback activity and longer collaboration period (Mayo, Kakarika, Pastor, & Brutus, 2012; Phielix, 2012).
During the peer feedback process, the feedback provider must focus on the quality of feedback. Feedback must include a summary, identification and location of the problem, and suggestions on potential solution to the problem (Nelson & Schunn, 2009). Building on De Nisi & Kluger’s (2000) concept Hattie and Timperley (2007) highlighted the importance of affective dimension of the feedback received, which could impact the implementation of the feedback and consequently its effectiveness. Therefore, feedback should include neutral, non-judgmental language. It should be based on observation, task, and task performance and not on the individual (Branch & Paranjape, 2002; Schartel, 2012, De Nisi & Kluger, 2000).

Including praise-oriented advice, could also augment the feedback receiver’s perception regarding the reviewer and may increase the likelihood of implementing the rest of the feedback (Nelson & Schunn, 2009).

Post Feedback Phase

The goal of peer feedback does not end with the receiver receiving the feedback. How the feedback is received and acted upon is as important as providing the feedback (Eva et al., 2012). Research indicates that students are motivated to process and incorporate feedback if they get the opportunity to discuss and clarify the received feedback (Hovardas et al., 2014; Kamp et al., 2013). Thus, students should be encouraged to discuss and clarify received feedback either through face-to-face discussion or web-based tools. Research by Hovardas et al., (2014) indicate that if students are getting multiple peer feedback or expert feedback cross-checking for negative or critical feedback increases the likelihood of implementation of the feedback. Finally,
developers and instructors need to be aware that implementing peer feedback takes time as students need adequate time to process what is communicated to them (Mayo, Kakarika, Pastor, & Brutus, 2012), thus a longer collaboration period could maximize the effectiveness of peer feedback (Phielix, 2011).

Conclusion

This paper presents a conceptual framework justifying the centrality of peer feedback in contemporary education and explaining the cognitive process of peer feedback. We argue that engaging in peer feedback can help students develop reflection and self-assessment skills. There is also evidence of learning improvements among students as a result of engaging in peer feedback (Falchikov, 2001). Although peer feedback activities have become more commonplace in various curricula, student motivation and potential benefits of peer feedback are undermined due to poor designing of the activity. Thus, we discussed the factors that undermine the importance of peer feedback and suggest instructional strategies to maximize the educational value of peer feedback.

Peer feedback can provide a reciprocal learning experience in a learner-centered collaborative environment. In a typical peer feedback activity students are expected to engage in various cognitive and metacognitive process necessary for self-assessment and reflective practice. The evidence-based literature on factors influencing peer feedback allows us to understand the importance and complexity of designing learning environment that promote meaningful peer feedback. If designed properly, peer feedback could be an effective medium to promote reflection, self-assessment skills and learning outcomes among students. The instructional guidelines presented in the paper could be used by instructors and developers to
design effective peer feedback activity. Future research will focus on designing and testing the peer feedback framework presented in the paper.
References


CHAPTER 3

EXPLORING PEER FEEDBACK STRATEGIES TO PROMOTE POSITIVE ATTITUDE TOWARDS PEER FEEDBACK AMONG PHARMACY STUDENTS IN A PHARMACOTHERAPY COURSE

2 Mishra, S. D, & Bourg, C. To be submitted to The American Journal of Pharmacy Education.
Abstract

Peer feedback, considered as the learning element of peer assessment is an essential skill in healthcare professional practice. The purpose of this study was to investigate pharmacy students’ perceptions and attitude towards various aspects of peer feedback practices and identify the issues that encourages or discourages their participation in peer feedback activities. An explanatory sequential mixed-method approach with a 20-item electronic survey and semi-structured interviews were used to collect data from students enrolled in a required pharmacotherapy course at a major public university in southeast United States. Surveys were sent to 137 students and 53% completed the surveys. Survey results indicate that, more students (90%) agreed that their peers are competent enough to provide constructive feedback, whereas only 78% believed in their own competency to provide feedback to their peers. Over 81% of students preferred receiving feedback from a peer they have previously worked with. The interview data revealed three major themes regarding PharmD students’ perception of peer feedback activity, namely, (1) participants’ perspectives about the value of peer feedback, (2) learning from peer feedback, and (3) significance of the individuals participating in the peer feedback activities. Perceptions of competency, the perceived value of peer feedback, and interrelationship among peers are important determinants of students’ willingness to participate in peer feedback. Education and training in techniques and benefits of peer feedback, as well as opportunity to practice the skill can help students promote positive attitude towards peer feedback.

Keywords: peer feedback, peer evaluation, pharmacy students, perception, attitude
Introduction

Peer feedback, considered as the learning element of peer assessment (Liu & Carless, 2006) is an essential skill in healthcare professional practice (Cushing, Abbott, Lothian, Hall, & Westwood, 2011; Miesner, Grady, & Trewet, 2012; Wu, Davison, & Sheehan, 2012). Pharmacy professionals are required to provide constructive feedback to individuals under their supervision (Miesner, et al., 2012), as well as participate in peer review of manuscripts in pharmacy journals (Wu, et al., 2012). Furthermore, the change in focus of pharmacy professional from products to patients (Droege, 2003) has warranted interprofessional collaboration (Gilbert et al., 2000; Van Winkle et al., 2013) and effective feedback exchange (Miesner et al., 2012) to improve therapeutic outcome and optimize patient care. This change in direction is largely driven by the recent focus of Accreditation Council for Pharmacy Education (ACPE Standards, 2016) towards reflective practice and has resulted in a shift from didactic lecture-based classes to more learner-centered approach (Kritikos, Woulfe, Sukkar, & Saini, 2011). Thus, Problem-based learning (PBL) and Case-based Learning (CBL) approaches are being used in pharmacy curriculum to equip students with a diverse set of skills required to deal with complex, real-world patient care practices (Dupuis & Persky, 2008; Nicholl & Lou, 2012). However, assessment practices to gauge student progress in these pedagogical techniques do not always align with what students are expected to learn in these courses (Eva, 2001). Peer feedback as a formative assessment approach has been identified as an appropriate and effective method to evaluate student learning and prepare students as self-directed, life-long learners (Kritikos, et al., 2011; Miesner, et al., 2012; Nicholl & Lou, 2012).

Although research indicates positive learning experiences and outcomes among pharmacy students when peer feedback activities are incorporated into the curriculum (Theising,
Wu, & Sheehan, 2014), there is limited evidence that pharmacy programs across the country are actively training students in peer evaluation (Miesner, et al., 2012). Different aspects of peer feedback activities could play a role in encouraging or discouraging students in participating such activities. Kritikos et al., (2011) studied pharmacy students’ perceptions and attitude towards peer assessment and found that although more than 75% of the students agreed that peers should assess each other, less than 50% of the students were confident that their peers can fairly assess their work. Further, Wu and colleagues (2012) in a similar study with pharmacy students found that although more than 95% of the students surveyed were comfortable in receiving feedback from their peers, only 80% were confident of their own capabilities to provide constructive feedback. Understanding these conditions, which has the potential to encourage or deter students from participating in these activities, could ultimately help optimize the educational value of peer feedback.

Unlike previous studies, the researchers in this study aimed to go beyond perceptions of pharmacy students towards peer feedback, to identify factors, which according to pharmacy students are helpful or a deterrent to their participation in peer feedback activities. Therefore, the purpose of this study is to investigate pharmacy students’ perceptions and attitude towards various aspects of peer feedback practices and identify the issues that will encourage or discourage their participation in peer feedback activities.

**Method**

The specific research questions for the present study are, (1) what are the strategies and conditions that pharmacy students believe promote their positive attitude towards peer feedback activities; (2) how do pharmacy students perceive the value of peer feedback as an instructional strategy? An explanatory sequential mixed-method approach was used to explore how pharmacy
students perceived peer feedback and the factors that encouraged or discouraged their participation in peer feedback activities (Creswell & Creswell, 2005; Tashakkori & Teddlie, 1998). In the present design, the quantitative study is dominant and is followed by a qualitative study (QUAN→qual) (Morse, 1991). Quantitative data was collected first and then qualitative data was collected that helped refine and explain the statistical findings.

The context of the study was Pharmacotherapy I, a 3-credit hour, required course for second-year Pharmacy students at a major public university in southeast United States. The course is designed to provide students with evidence-based information on a wide variety of disease states, and prepare them to apply relevant information and knowledge in solving patient-specific problems. The course follows a case-based learning approach with multiple small and large group discussions, quizzes, and written assignments and is designed to help students identify pathophysiology associated with disease states, and integrate drug related data to formulate evidence-based treatment plans. The course had an option of a peer feedback activity, which the students could opt as a pre-existing group of 5 or 6 students. Students participating in the peer feedback activity exchanged their answers on their pharmacotherapy decisions on a patient case and anonymously evaluated their peers’ feedback on their own work. Students who did not opt for the peer feedback activity completed patient case assignments individually.

The investigators developed a survey to gauge students’ opinion about elements of peer feedback practice that might influence students’ willingness to participate in peer feedback activities. Through the literature review, six essential elements of peer feedback were identified: goal setting, inclusion of feedback criteria, training in developing constructive feedback, credibility of source, quality of feedback exchanged, and relationship between feedback provider and receiver (see Table 1). Setting goals at the beginning of the activity allows students to see the
discrepancy between their current learning and their anticipated goal (Archer, 2010; Hattie & Timperley, 2007). Thus, awareness of the explanation of the purpose and goal of peer feedback activity could influence the effectiveness of peer feedback. Research indicates that involving students in constructing feedback criteria has a positive impact on the peer feedback process as their participation help them gain a better understanding of the requirement and purpose of the assignment which enhances the quality of their learning (Heylings & Stefani, 1997; Orsmond et al., 1996). Furthermore, training or the lack of it, in providing constructive feedback to their peers has been found to affect the effectiveness of peer feedback (Burgess et al., 2013; Sluijmans, Brand-Gruwel, & Van Merriënboer, 2002). Among individual factors, studies have shown that credibility of the source of feedback (Hovardas, Tsivitanidou, & Zacharia, 2014; Tsui & Ng, 2000), the quality of feedback exchanged (Nelson and Schunn, 2009), and the interpersonal relationship between the feedback provider and receiver could determine the effectiveness of peer feedback (Bok et al., 2013; Chou et al., 2013).

Based on the six identified elements of peer feedback practice, a survey instrument was developed (See Appendix A). The survey instrument consists of a total of 20 items and designed to measure agreement (Strongly Agree to Strongly Disagree) on a 4-point Likert-type scale. The survey includes one demographic question (e.g. gender), two general questions regarding prior experience with peer evaluation (e.g. Have you had prior experience with peer evaluation? and If Yes, how do you perceive peer feedback activities in general? The remaining 15 items are developed based on the six elements of peer feedback that might influence students’ participation in peer feedback activities (see Table 1). Finally, there are two items intended to measure whether students view peer feedback as a professional skill that they will be using in their future career (e.g. Knowing how to provide constructive feedback will be helpful in my future career,
and I believe peer feedback/assessment is a skill I will use in my pharmacy career). In previous research, similar language has been used in related research in peer feedback (Ertmer et al., 2007; Nicol, Thomson, & Breslin, 2014).

The survey was piloted with 33 pharmacy students from Disease State Management I (PHRM 4850) class in spring 2015. The survey was modified in terms of wordings, order and number of items after the pilot test. The current survey was found to have good internal consistency with a Cronbach’s alpha of .82. Although this survey needs further validation for future studies, measures were taken to ensure the level of precision needed for the present study, to gauge perceptions and attitudes of participants regarding peer feedback practices. A 10-minute in-class presentation was held in the beginning of the fall (2016) semester to introduce the peer feedback project to the students. Electronic surveys were sent to all (137) second-year Pharmacotherapy I students in emails, and two reminder emails were also sent before the end of the semester. Students did not receive any incentives for completing the survey. Qualtrics software was used to design and distribute the surveys electronically and informants gave electronic consent before completing the survey. All quantitative data analysis was done using SPSS v.29.

Since the goal of the present study was to afford both deep and broad insights into pharmacy students’ perception of peer feedback, an interview invitation was sent to students who completed the survey. Five students who participated in the peer feedback activity, consented and interviewed to gauge pharmacy students’ perceptions of and attitude towards peer feedback as an instructional strategy. A constant comparative approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990) was used to analyze the interview data. As the data collection and analysis continued, codes and categories were developed and grouped together by constantly comparing
the similarities and differences in the data. All 5 student participants received gift cards in accordance with Institutional Review Board criteria.

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<th>Elements of Peer Feedback Practice</th>
<th>Justification</th>
<th>Survey Items</th>
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<tr>
<td><strong>Goal Setting</strong></td>
<td>Lack of clear goals/direction undermines the value of feedback exchange</td>
<td>• Knowing the goals of peer feedback activity is important to me.</td>
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<td>(Kamp et al., 2014; Phielix et al., 2011).</td>
<td>• Having a clear objective helps me in the exchange of peer feedback.</td>
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<tr>
<td><strong>Inclusion of Feedback Criteria</strong></td>
<td>Students’ lack knowledge of feedback criteria negatively impacts the</td>
<td>• Having a rubric is important to understand the requirements of peer feedback.</td>
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<td>effectiveness of peer feedback (Cheng &amp; Warren, 2005; De Grez, Valeke, &amp; Roozen, 2012; Heylings &amp; Stefani, 1997; Orsmond et al., 1996; Purchase, 2000).</td>
<td>• Having a rubric helps me evaluate the strength and weaknesses of my peers' work.</td>
</tr>
<tr>
<td><strong>Training in Developing Constructive Feedback</strong></td>
<td>Lack of or inadequate training in how to provide constructive feedback could hinder the effectiveness of peer feedback. (Burgess, 2013; Cassidy, 2006; Gielen, Peeters, Dochy, Onghena, &amp; Struyven, 2010; Prins, Sluijmsans, &amp; Kirschner, 2006; van Zundert, Sluijsmans, van Merriënboer, 2010).</td>
<td>• Getting training on providing feedback is important to me.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• I feel competent enough to evaluate my peers' work even without training.</td>
</tr>
<tr>
<td><strong>Credibility of Source</strong></td>
<td>Skepticism towards competency of peers in providing constructive feedback could negatively impact the outcome of peer feedback activity. (Tsui &amp; Ng, 2000; Yang, Badger, and Yu, 2006.)</td>
<td>• I prefer teacher feedback to peer feedback.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The quality of peer feedback is more important to me than knowing who provided the feedback.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My peers are competent enough to provide me with constructive feedback.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• I value peer feedback as much as instructor feedback.</td>
</tr>
<tr>
<td><strong>Quality of Feedback Exchanged</strong></td>
<td>Lack of accuracy, specificity, and justification in the feedback undermines the value of peer feedback (Gielen et al., 2010; Nelson &amp; Schunn, 2009; Tseng &amp; Tsai, 2007).</td>
<td>• The negative comments I receive from my peers are always accompanied with justification.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The peer feedback I receive are specific to the issues in my work.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The feedback I receive from my peers are of high quality.</td>
</tr>
<tr>
<td><strong>Relationship between Feedback Provider and Receiver</strong></td>
<td>Relationship between the feedback provider and receiver could impact the effectiveness of the feedback exchanged and the peer feedback activity. Provider and Receiver (Bok et al., 2013; Chou, Masters, Chang, Kruidering, &amp; Hauer, 2013; Eva et al., 2012; Sadler, 1998).</td>
<td>• Working relationships with peers or the absence of it does not impact my acceptance of peer feedback.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• I prefer feedback from a peer that I have previously worked with.</td>
</tr>
</tbody>
</table>
The surveys were sent to one hundred and thirty-seven students; and seventy-five participants completed the survey thus, the actual response rate was 53% (73/137). Analysis revealed that two students did not go beyond the consent page. Those two submissions were discarded. The descriptive statistics for the survey are presented in Table 3.2. The first two interviews were coded by SM independently and then discussed the codes with CB. Following the shared understanding SM subsequently coded the remaining interviews.

### Table 3.1: Elements of Peer Feedback Practice

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>SD</th>
<th>Agreement No. (%)</th>
<th>Disagreement No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowing the goals of peer feedback activity is important to me.</td>
<td>3.19</td>
<td>0.59</td>
<td>65 (90.28%)</td>
<td>7 (9.72%)</td>
</tr>
<tr>
<td>Getting training on providing feedback is important to me.</td>
<td>3.01</td>
<td>0.65</td>
<td>60 (82.19%)</td>
<td>12 (17.81%)</td>
</tr>
<tr>
<td>I prefer teacher feedback to peer feedback.</td>
<td>3.38</td>
<td>0.65</td>
<td>66 (90.42%)</td>
<td>7 (9.59%)</td>
</tr>
<tr>
<td>The negative comments I receive from my peers are always accompanied with justification.</td>
<td>2.67</td>
<td>0.69</td>
<td>43 (59.72%)</td>
<td>29 (40.28%)</td>
</tr>
<tr>
<td>The quality of peer feedback is more important to me than knowing who provided the feedback.</td>
<td>3.32</td>
<td>0.66</td>
<td>67 (91.78%)</td>
<td>6 (8.22%)</td>
</tr>
<tr>
<td>Having a clear objective helps me in the exchange of peer feedback.</td>
<td>3.37</td>
<td>0.54</td>
<td>71 (97.26%)</td>
<td>2 (2.74%)</td>
</tr>
<tr>
<td>I feel competent enough to evaluate my peers’ work even without training.</td>
<td>2.92</td>
<td>0.68</td>
<td>57 (78.08%)</td>
<td>16 (21.92%)</td>
</tr>
<tr>
<td>The peer feedback I receive are specific to the issues in my work.</td>
<td>3.11</td>
<td>0.52</td>
<td>66 (91.66%)</td>
<td>6 (8.33%)</td>
</tr>
<tr>
<td>Having a rubric is important to understand the requirements of peer feedback.</td>
<td>3.45</td>
<td>0.60</td>
<td>69 (94.52%)</td>
<td>4 (5.48%)</td>
</tr>
<tr>
<td>Working relationships with peers or the absence of it does not impact my acceptance of peer feedback.</td>
<td>2.65</td>
<td>0.75</td>
<td>41 (56.94%)</td>
<td>31 (43.06%)</td>
</tr>
<tr>
<td>Knowing how to provide constructive feedback will be helpful in my future career.</td>
<td>3.56</td>
<td>0.50</td>
<td>73 (100.00%)</td>
<td>0 (0.00%)</td>
</tr>
<tr>
<td>Having a rubric helps me evaluate the strength and weaknesses of my peers’ work.</td>
<td>3.44</td>
<td>0.55</td>
<td>70 (97.22%)</td>
<td>2 (2.78%)</td>
</tr>
<tr>
<td>I value peer feedback as much as instructor feedback.</td>
<td>2.60</td>
<td>0.90</td>
<td>41 (56.17%)</td>
<td>32 (43.84%)</td>
</tr>
</tbody>
</table>
The feedback I receive from my peers are of high quality.  2.81 0.61 53 (72.60%) 20 (27.40%)
I prefer feedback from a peer that I have previously worked with.  3.06 0.64 59 (81.94%) 13 (18.06%)
I believe peer feedback/assessment is a skill I will use in my pharmacy career.  3.29 0.68 65 (90.28%) 7 (9.72%)
My peers are competent enough to provide me with constructive feedback.  3.10 0.58 66 (90.41%) 7 (9.59%)

Quantitative results

Students’ perception towards peer feedback practices are presented in table 3. Seventy-nine percent of students surveyed reported having prior experience with peer feedback. Over 90% students reported that having a clear goal or objective of peer feedback helps them in exchanging feedback with their peers. More students (97%) agreed that rubric is more useful in evaluating their peers’ work than using the rubrics to understand the requirements of the activity (95%).

Eighty-two percent of students agreed that training on how to provide constructive feedback is important to them, and all of them (100%) agreed that knowing how to provide constructive feedback will be helpful in their future career. However, only 90% believed that they will be using peer feedback in their future pharmacy careers.

Over 91% of students expressed that quality of feedback is more important to them than knowing the source of the feedback. Despite this importance to the quality of feedback over source, only 56% of students reported that they value peer feedback as much as instructor feedback, and 90% of the students surveyed preferred instructor feedback to feedback received from peers.

Although over 91% of students agreed that the peer feedback they receive are specific to issues
in their work, only 60% reported that the negative comments by their peers are accompanied with justification.

More students (90%) agreed that their peers are competent enough to provide constructive feedback, whereas only 78% believed in their own competency to provide feedback to their peers. Although students believed in the competency of their peers, only 72% agreed that the feedback they receive from their peers are of high quality. Over 81% of students preferred receiving feedback from a peer they have previously worked with, and only 57% of students agreed that they would accept feedback from a peer that they haven’t previously worked with.

**Qualitative results**

The interview data revealed three major themes with regard to pharmacy students’ perception of peer feedback activity, namely, (1) participants’ perspectives about the value of peer feedback, (2) learning from peer feedback, and (3) significance of the individuals participating in the peer feedback activities.

**Participants’ perspective about the value of peer feedback**

In discussing their attitude towards peer feedback in general, the interview participants expressed positive views regarding peer feedback as an instructional activity. All of the participants indicated that peer feedback was helpful. For example, one participant stated: “it gives you insight into your own work”. Another student shared: “I think it (peer feedback) worked well, I learned a lot about my group and how to provide feedback and different ideas on cases, and I think it was a really good experience”. The data indicated that peer feedback was helpful to pharmacy students in general and especially in learning their class materials. Participants also discussed the deterrents of participating in a collaborative peer feedback activity. Four out of five participants interviewed indicated the fear of providing negative
feedback as the biggest drawback to participate in a peer feedback activity. As one participant shared:

“I think…the biggest drawback is that people were scared to provide negative feedback on things that you could work on. They always say what you did good, what they liked, but stayed away from saying how you could improve, or what you could have said or done differently”.

The data also revealed that the interview participants weighed their willingness to participate in peer feedback activity in terms of how confident they were in their own competency to provide feedback; as well as the competency of their peers to provide useful feedback. Most participants agreed that they were confident in their peer’s ability to provide meaningful feedback, however, competency of their peers did play a role in their acceptance of the feedback received. One participant shared her concern as followed:

I think sometimes it could be a hindrance, if they super agree with your answers, and stay away from criticism, … but more importantly, than that, I would probably say if you didn’t trust the person who is reviewing it, as far as their knowledge about it, I would probably say that would be the hardest thing.

At least one participant talked about her lack of confidence to provide feedback as a deterrent to participate in the activity.

Answering the cases that we were presented with, I am not sure that anybody was a hundred percent confident in answering it…I think that was a big concern, even when I was answering the questions and providing feedback, I wasn’t totally confident about my own answers.
The data indicated time management issues in learning as the second most frequently cited reasons why students were reluctant to participate in a peer feedback activity. One participant stated, “another thing that makes me not do peer feedback is to put on extra time to go through somebody else’s work”. Participants indicated that, peer feedback would be more helpful if they would get a longer duration of time to complete the cases.

**Learning from peer feedback**

Interview participants primarily discussed learning about a different perspective on a patient case from their peers’ feedback.

Peer feedback gives me the opportunity to work independently, do a case, and have somebody analyze what I have written, and tell me what they would have done the same or done different, …Because I know that my answers were not perfect, I could have done things differently, but nobody is going to take the time, analyze it and tell you unless you are in a peer feedback group.

Participants also discussed how peer feedback provides an insight into their own work, when they receive feedback from their peers on what they missed, and how they could improve their work. One participant shared,

(peer feedback) shows me how I could be in-depth while presenting the case and add more information about the case in giving my answers, that helps me learn in the long run, I make sure I include all steps while giving my answers and not leaving any information out.

One participant differentiated between the usefulness of formative feedback with that of summative feedback received from teachers at the end of a graded assignment.
I feel like when I get feedback from teachers, I read it but since the grade is already done, I don’t necessarily go back and look at it, but with peer feedback, it kind of forces me to look back and see these are the points that you missed, and so to me these are extremely helpful because then when I get to a graded assignment, I need to watch for these points that I missed along with the points that I previously got as well.

The data indicated that participants take their peers’ feedback into consideration not only to improve their current assignment, but also use the feedback as a checklist for future work.

**Significance of peers in peer feedback activities**

Trusting one’s peers, perceived competency of peers, and interrelationship among group members came up in all the interviews, emphasizing the importance of socio-emotional issues in peer feedback practices.

Emotions can play a role in anything. You try to keep that away. It is not a primary hindrance for this to work but I definitely think that it is a factor. I am very fortunate that I am in good terms with my group members but it can also be hard if like they say something and you take it wrong way. I think having open communication is huge.

The data indicated that participants were extremely mindful of their group dynamics and their interrelationship with their peers. Although participants were cautious about providing negative feedback to their peers, the interviews revealed that they were equally concerned about the competency of their peers in providing quality, constructive feedback to them. “I think that peer feedback is helpful, if you trust the people, if you don’t trust your peers, it could be waste of time, or it could be frustrating, and create more tension”. Participants generally agreed that their peers are knowledgeable enough to provide feedback on the subject; however, couple of
participants suggested training on how to provide constructive feedback would be helpful. One participant stated,

I think training may be a little helpful, only because of different experiences in peer feedback, like I know some students had previous experiences with peer feedback and they know how to provide constructive feedback and other people have not done much of it, so they are not kind of used to it. I think training would be helpful to get everybody on the same page.

The interviews revealed that participants were not very enthusiastic about the need for training, although they did admit that training could be helpful to students in teaching techniques of providing constructive feedback to peers.

Discussion

Although there have been studies on perception and attitudes of pharmacy students toward peer feedback and assessment (Kritikos et al., 2011; Miesner et al., 2012; & Wu et al., 2012), this study was conducted to understand why certain factors may affect students’ attitude towards peer feedback, and consequently influence their decision to participate in such activities. This study uses a literature based survey instrument and semi-structured interviews to gauge the perceptions of students in a PharmD program in a case-based setting.

The survey results together with the interview data indicates the generally favorable attitude held by students towards peer feedback and assessment, and are consistent with other similar studies (Basheti, Ryan, Woulfe, & Bartimote-Aufflick, 2010; Wu, et al., 2012). Ninety percent of students surveyed agreed that their peers are competent enough to provide constructive feedback to them; whereas only 78% believed in their own competency to provide meaningful feedback. This finding is different from a study conducted by Wu and her colleagues
(2012) with PharmD students in which 95% students agreed that they had the necessary skills to assess their peer’s work and 91% agreed their peers possess the necessary skills to evaluate their work. The discrepancy in variance could be attributed to the type of work the students were dealing with in the class. In the present study students were working with case studies, which tested their knowledge on pharmacotherapy, whereas in the Wu and colleagues (2012) study students were assessed on their work quality and work ethic.

Several studies have highlighted the need for adequate training in peer feedback as a caveat in ensuring effectiveness of peer evaluation in pharmacy education (Basheti et al., 2010; Kritikos et al., 2011; Miesner et al., 2012). Students generally reported benefits of training sessions in peer feedback practices (Gielen et al., 2010; Prins et al., 2006; Sluijmans, 2002), and have indicated that adequate training could help them craft accurate and useful feedback for their peers (Burgess et al., 2013). In the present study, participants did not seem to be enthusiastic about training and only 82% agreed that getting training in providing feedback is important to them. One possible explanation behind the survey data is that 79% of the students surveyed had prior experience with peer feedback, which might make them confident of the requirements of the activity. Further, insights from the interview data reveals that students mostly considered their peers as having the same level of expertise in the subject matter as themselves and suggested training in techniques of peer feedback for those who did not have prior experience in peer feedback. The perceptions of participants towards training in this study partially contradicts the findings of Hovardas and colleagues (2014) which asserts that guidance and scaffolding are essential determinants in the effectiveness of peer feedback and no amount of prior experience or even training could prepare the students fully for the dynamicity in reciprocal peer feedback.
Findings indicated that interrelationship among peers is important to students while deciding to participate in a peer feedback activity. Results of this study indicate that more students preferred feedback from peers they previously worked with, highlighting the importance of a trusting environment for peer feedback (Chou et al., 2013). Several factors including self-confidence of the learner, previous training and experiences with peer feedback, as well as interpersonal relationship among peers contribute to help create this trusting environment (Bok et al., 2013; Chou et al., 2013; Eva et al., 2012). One possible way to foster a trusting environment would be to have students work together for a considerable period, to promote cohesiveness and optimal team performance (Farland et al., 2013).

As the interview data revealed, students generally stay away from providing negative/critical feedback to their peers for fear of causing social rifts. This social discomfort in providing critical feedback in the present study resonated with the findings of Burgess and colleagues (2013). Although anonymity has been put forth as a potential solution (Basheti et al., 2010) to counter this challenge, true anonymity is hard to achieve, especially when students work in small groups. Using peer feedback as a means of formative assessment where students can use the feedback to improve their work (Tai, Canny, Haines, & Molloy, 2016) could help diminish some of the fears associated with providing negative feedback to peers. Further, using a form of positive critique method (Burgess et al., 2013), which provides a standard framework for constructive feedback, could ease some of the tensions associated with negative peer feedback.

In this study, lack of confidence and skepticism about peers’ competency are the primary reasons for reluctance in participating in peer feedback practices. The issue of competency was raised in earlier studies (Burgess et al., 2013; Cassidy, 2006) and training in peer feedback technique was suggested as one possible way to boost confidence among students (Gielen et al.,
Students placed greater value on expert feedback than peer feedback, which corroborates with the findings of similar studies (Tai et al., 2016; Yang et al., 2006). Interview participants also talked about time, especially time spent going through peers’ work as a deterrent for participating in peer feedback activities. Students often do not realize the cognitive and metacognitive value associated with peer feedback. Therefore, along with training in peer feedback skills, education on how students are engaged in cognitive activities such as critical thinking and self-assessment (Lin, Liu, & Yuan, 2001; Topping, 1998) while reviewing their peers’ work could foster a positive attitude toward peer feedback.

In the present study, although all participants agreed that knowing how to provide feedback would be helpful in their future careers, not all of them believed that they will be using peer feedback in their pharmacy careers. Peer review of manuscript is an integral part of professional pharmaceutical career (Brazeau, DiPiro, Fin cham, Boucher, & Tracy, 2008), and pharmacists also engage in annual faculty peer review process endorsed by ACPE. For students to learn the techniques of providing constructive peer feedback, first, they must need to understand that they will be using this skill in their future careers; and second, they need to be provided with opportunities to practice the skill (Miesner, et al., 2012).

Peer feedback can be a valuable tool to deal with complex patient care challenges in pharmaceutical practices. Students reported getting insight into their own work as result of peer feedback, and both giving and receiving feedback was perceived as valuable by students. There are two major limitations to the study. First, only a few more than half of students enrolled in the class completed the survey, and only five students agreed to be interviewed, thus the responses collected do not represent all the students in the class. Secondly, half of the students completing
the survey also participated in a peer feedback activity, which might have influenced their responses to the survey questions. A future longitudinal study with a bigger sample size, and student reaction both at the beginning and end of peer feedback activity could help determine their perception over time. More research is needed on peer feedback perception and responses to different components of peer feedback implementation. Amongst others, learner characteristics such as understanding of the goals of the activity, ability to apply feedback criteria, and evaluate the strengths and weaknesses of feedback (Hovardas et al., 2014) are important determinants of success or failure of a peer feedback activity. Future research might focus on students’ skills and characteristics to examine the impact on outcomes of peer feedback activities.

**Conclusion**

To summarize, the interplay between perceptions of competency, the perceived value of peer feedback, and interrelationship among peers, appears to create the dynamicity in a peer feedback activity, which in turn determines the effectiveness of peer feedback. In the present study, student responses and survey data suggest that most participants perceive peer feedback as a valuable learning skill and agree that they benefit from participating in peer feedback. Additionally, most students enrolled in the Pharmacotherapy course agreed that peer feedback is a skill they will use in their future pharmacy careers. Participants perceived the competency of their peers and their own level of perceived competence, as well as a safe and trusting environment as essential for peer feedback to be effective. Measures should be taken to address these challenges while designing a peer feedback activity.
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CHAPTER 4

PEER FEEDBACK AS A MEDIUM TO FACILITATE REFLECTIVE PRACTICE AMONG PHARMACY STUDENTS IN A CASE-BASED LEARNING ENVIRONMENT ³

³ Mishra, S. D, Rojewski, J., & Bourg, C. To be submitted to Currents in Pharmacy Teaching and Learning.
Abstract

There has been increasing focus on reflective practice in pharmacy education. The Accreditation Council of Pharmacy Education (ACPE), recognizes that being able to reflect is a key element in preparing pharmacy professionals to meet the challenges of a dynamic healthcare environment. This study sought to explore the pedagogical benefits of peer feedback by designing, developing, and implementing a peer feedback activity to facilitate reflective practice among pharmacy students. A mixed-methods approach was used in the study to investigate whether there was a relationship between students’ perceived effectiveness of peer feedback and their reflective thinking scores. Twenty Second-year PhramD students out of 137 in a required Pharmacotherapy course participated in a peer feedback activity and five students volunteered for semi-structured interviews. No significant correlation was found between perceived effectiveness of peer feedback and reflective thinking skills of students. Qualitative interview data revealed three major themes regarding PharmD students’ perception of peer feedback as an instructional strategy in promoting reflective practice, namely, (1) Cognitive process of providing feedback, (2) Cognitive process after receiving peer feedback, and (3) Perception of peer feedback as a tool to exercise reflective practice. Although our data is limited to a small group of students, important lessons were learned on how to design, develop, and implement a peer feedback activity.

Keywords: peer feedback, instructional design, case-based learning, pharmacy education
Introduction

Increasingly, scholars have noted the need for reflective practice in pharmacy education (Droege, 2003; Nuffer et al., 2013; Tsingos, Bosnic-Anticevich, & Smith, 2014). The 2016 Standards for the Doctor of Pharmacy (Pharm D) degree, issued by the Accreditation Council for Pharmacy Education (ACPE), call for an increased emphasis on developing self-awareness. For example, Standard 4.1 on Personal and Professional Development indicates that pharmacy students should “examine and reflect on personal knowledge, skills, abilities, beliefs, biases, motivation, and emotions that could enhance or limit personal and professional growth” (p. 2). In other words, students are expected to reflect on their own learning and adequately self-assess (be aware of) their learning needs. The role of reflective practice in bridging the gap between theoretical knowledge and real-world problem solving is a challenge for students in healthcare profession with high stake consequences (Brackett & Reuning, 1999; Smith, Krass, Sainsbury, & Rose, 2010). Integrating reflective learning activities into pharmacy curriculum can better prepare students to face the challenges of professional clinical practice (Tsingos et al., 2014; Tsingos-Lucas, Bosnic-Anticevich, Schneider, & Smith, 2016). Therefore, the rationale for integrating reflective practice in pharmacy curriculum is twofold: to provide a robust knowledge base in preparing functioning practitioners, and prepare students to engage in continuous (lifelong) professional development and learning (Wallman, Lindblad, Lundmark, & Ring, 2008).

Examples of activities used in clinical education programs to promote reflective practice exist. For example, portfolios (Goodyear, Bindal, & Wall, 2013; Plaza, Draugalis, Slack, Skrepnek, & Sauer, 2007), blogging (Dunne & Ryan, 2016; Wright & Lundy, 2012), and
reflective journaling (Bouldin, Holmes, & Fortenberry, 2006; Fischer, Haley, Saarinen, & Chretien, 2011) have been shown to enhance the reflective capacity of students.

Peer assessment and feedback has also been used in clinical education settings to aid in student reflection (Hulsman, Harmsen, & Fabriek, 2008; Sargeant, Mann, Sinclair, Van der Vleuten, & Metsemakers, 2008). However, limited evidence-based research on peer feedback in pharmacy education exists. Students involved in peer feedback engage in critical thinking (Lin, Liu, & Yuan, 2001) and report metacognitive gains, e.g., accurate self-assessment skills (Topping, 1998). As the role of the pharmacy professional continues to shift from product to patient care (Droege, 2003), emphasis should be placed on interprofessional collaboration and effective feedback exchange. While limited, existing literature describes the positive outcomes for students when peer feedback activities are included in pharmacy curriculum (Miesner et al., 2012; Theising, Wu, & Sheehan, 2014).

Evidence suggests that the integration of peer feedback activities into pharmacy curriculum can provide a potentially effective pedagogical approach to facilitate reflective practice and encourage lifelong learning. Despite the benefits of peer feedback, limited information exists to guide pharmacy school educators in using peer evaluation to develop reflective practice in their students (Miesner, Grady, & Trewet, 2012). Therefore, we describe the design, and implementation of a peer feedback activity in a case-based learning environment. We also explore the relationship between students’ perceived effectiveness of peer feedback and their reflective thinking scores with an aim to facilitate reflective thinking among pharmacy students. This discussion contributes to our existing knowledge on teaching reflective practice skills by incorporating peer feedback and situating this approach in a case-based learning
environment. Collectively, the case provides pharmacy educators with an example of using peer feedback as one method for developing reflective practice skills in pharmacy students.

**Case-Based Learning**

Case-based learning (CBL) refers to a student-centered educational paradigm that focuses on key points of a clinical case around which instruction is conducted (Ives, Deloatch, & Ishaq, 1999). The use of CBL and problem-based learning (PBL; Williams, 2005) have been well documented in health profession education including pharmacy (Dupuis & Persky, 2008; Garvey, O'Sullivan, & Blake, 2000; Thistlethwaite et al., 2012). Although CBL and PBL share a common goal of integrating knowledge with practice, CBL focuses on the application of previously learned materials to solve clinical cases, while PBL uses a specified problem to guide initial learning (Garvey et al., 2000). A well-constructed case highlights important elements of the real-world situation and helps prepare learners for similar occurrences in future (Savery, 2015). In CBL, cases are presented to small student groups in a progressive disclosure format (Srinivasan, Wilkes, Stevenson, Nguyen, & Slavin, 2007). First, learners are assigned readings and individual research. While learners share responsibility with facilitators in achieving predetermined learning objectives, facilitators assume control for guiding class discussion and ensuring that predetermined objectives are met (Srinivasan et al., 2007). The focus of a single case can range from only one or two issues to encompassing multiple concepts (Ives et al., 1999). CBL focuses primarily on solving specific, identifiable problems by applying learned clinical skills; thus, requiring that students be more actively engaged in the learning process. The CBL approach requires that both facilitator and learners interact in identifying problems of the case and possible solutions. Feedback received during these discussions reinforce learners’ comprehension (Dupuis & Persky, 2008).
Several studies have illustrated the advantages of using CBL in health profession education, e.g., developing critical thinking and problem-solving skills (Choi & Lee, 2009; DeMarco, Hayward, & Lynch, 2002), integrating theory with practice (DeMarco et al., 2002; Thistlethwaite et al., 2012), and improving communication skills in small-group settings (Dupuis & Persky, 2008; Savery, 2015). The CBL approach has also been shown to effectively facilitate the inter-professional learning experiences of medical, nursing, pharmacy, and social work student groups (Curran, Sharpe, Forristall, & Flynn, 2008). Dupuis and Persky (2008) redesigned a clinical Pharmacokinetics course to include small- and large-group CBL experiences within traditional teaching settings to successfully improve group interaction and student participation at a distant learning site. Their teaching evaluations indicated that students favored small-group CBL settings because of the relevance of their learning, i.e., demonstrating skills and competence required in the real-world. Dupuis and Persky (2008) reported that the CBL course format helped students at a distant learning site feel more engaged. The small-group interactions not only facilitated learning among students, but also enhanced their communication skills.

**Peer Feedback**

Providing and receiving feedback is viewed as an integral part of many professional practices (Eraut, 2004; Gordon, 2003; Van der Pol, Van den Berg, Admiraal, & Simons, 2008). Hattie and Timperley (2007) defined feedback as “information provided by an agent (peer) regarding aspects of one’s performance or understanding” (p. 81). Interestingly, literature indicates that feedback has benefits for both provider and receiver.

**Cognitive benefits for feedback provider.** One of the most important learning benefits of engaging in peer feedback for the provider (i.e., the one reviewing work and providing feedback) is that peer feedback allows them to engage in important cognitive activities such as
critical thinking, planning, monitoring, and regulation while reviewing their peers’ work (Lin, Liu, & Yuan, 2001). Engagement in these cognitive activities while critically evaluating peers’ work has been found to improve the quality of writing and overall academic success among students (Thomson, 2002). Exercise in these cognitive activities also help students become more accurate in self-assessment skills (Topping, 1998) and fosters a sense of autonomy over their own text (Tsui & Ng, 2000). This ownership of their own writing may help student become more confident in providing feedback to their peers.

Tsai, Lin, and Yuan (2002) studied the connection between the quality of reviews provided by preservice teachers about their peers’ science activities and their own science activity designs. They found that students who spent more time evaluating their peer’s work also improved their own work in the process (Tsai et al., 2002). The improvement that Tsai et al., (2002) found was attributed to student engagement in cognitive assessment and the critique of peers’ work, which helped them gain insight into the strength and weaknesses of their own work (Lu & Zhang, 2012). Kim and Ryu (2013) also demonstrated that reciprocal feedback between students helped them gain a better understanding of assignments. Students reported being more aware of task requirements and an increase in reflection and self-regulation in the learning process.

**Cognitive benefits for feedback receiver.** Receiving feedback from peers can be beneficial in many ways. Peer feedback settings provide more opportunities to view the work of others, which helps students in their own writing by expanding the informational resources available (Liu, Lin, Chiu, & Yuan, 2001). Evaluating the work of peers can help students become more aware of criteria and standards, which they can apply to their own work. Another
advantage of feedback is that it helps students detect errors and guides them in making improvements to their work (Hovardas, Tsivitanidou, & Zacharia, 2014; Liu et al., 2001).

Peer feedback promotes learning in receivers by requiring revisions to assignments based on feedback received (Topping, 1998). The process of revision requires that students engage in critical thinking to sort through and judge the value quality of peer feedback provided to them (Hovardas et al., 2014). Exchanging feedback among peers requires cognitive and metacognitive engagement, encouraging regulation and reflection on understanding material, learning new skills and constructing new knowledge.

Method

This two-phase explanatory sequential mixed-method study (Creswell & Plano Clark, 2007) was conducted to explore the role of peer feedback in facilitating reflective thinking skills of second-year pharmacy students in a case-based learning environment. In mixed-method research, a single research question is addressed using multiple approaches to data collection and analysis in one research design (Brewer, 2001).

In explanatory sequential design, the quantitative study is dominant and is followed by a qualitative study (QUAN→qual) (Morse, 1991). The qualitative study serves as an explanation and refinement of quantitative results (Creswell & Plano Clark, 2007). The strength of explanatory sequential design lies in its straightforward nature and the findings of both phases are reported separately followed by an interpretation of how the qualitative findings help explain the quantitative results (Creswell, 2014; Creswell, Plano Clark, Gutmann, & Hanson, 2003). However, it is also important to recognize potential threats to both internal and external validity in a mixed-methods design. The design of the present study includes a peer feedback activity in which participants engaged in writing three rounds of peer feedback, and had access to a training
module on how to provide constructive feedback. Therefore, threats to internal validity are a concern, as it is hard to conclusively report that the obtained relationship is real and not as a result of extraneous variables. This study contributes to a deeper understanding of peer feedback practices, and adds to the existing literature on developing and implementing peer feedback activities in various learning environments. However, the use of convenience sampling in the study limits the generalization of the findings beyond the current participants.

A purposive sampling technique was used to select interview participants for the qualitative portion of the study. Both convenience and purposive sampling are non-probability sampling techniques. Convenience sampling targets a particular group of interest (Pedhazur & Schmelkin, 1991). In purposeful sampling, participants are selected deliberately because of the quality of information they possess (Tongco, 2007).

In the first phase of the present study, quantitative correlational research was conducted to determine the relationship between effectiveness of peer feedback as assessed by peers and reflective thinking scores in PharmD students. In the second phase, interviews were conducted to understand the perceived role of peer feedback in promoting reflective practice among pharmacy students. Constant comparative approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990) was used to analyze the interview data.

The peer feedback activity was introduced to students in Pharmacotherapy I (PHRM 4870), 3-credit course required for second-year pharmacy students at the University of Georgia. The course provides evidence-based information on a wide variety of disease states in order to facilitate the application of relevant information and clinical knowledge to solve patient-specific problems. The purpose of the peer feedback activity in the Pharmacotherapy I course was to support the reflective practice efforts of the pharmacy curriculum.
Three case activities, each focusing on a different topic, were scheduled at various times during the 15-week class schedule. Students received cases for class preparation one week prior to a 75-minute face-to-face class. The feedback exchange occurred outside of class time and peer feedback and all related activities occurred within the timeframe of the case activity (one week). Due to lack of time, students were not walked through the training materials on how to provide constructive feedback. Instead, students were encouraged to access the resources in a folder available in eLearning Commons, the Learning Management System (LMS) used for the peer feedback activity.

Peer feedback evaluation data was collected from students using the Effectiveness of Peer Feedback scale after each of the three rounds of feedback. Data on students’ reflective thinking was collected using the Reflection-in-Learning Scale (RLS; Sobral, 2000). Out of 137 students in the class, thirty students initially consented to participate in the activity, but 10 students eventually dropped out. Thus, complete data was obtained for 20 students. Semi-structured interviews were conducted with five participants to further explore experiences and reactions toward the peer feedback activity and reflective practice. Interviews were transcribed verbatim and reviewed multiple times to gain an understanding of the content. Interview responses were categorized and coded. Themes were developed based on the content and meaning of identified categories.

The Peer Feedback Activity

The following steps were taken in incorporating the peer feedback activity into the Pharmacotherapy I course.

1. The peer feedback activity was conducted in small groups at three different time points in the semester, as a part of students’ pre-class assignment in
Pharmacotherapy I class. Students were grouped into three and stayed in the same group for all three rounds of feedback. All activities related to peer feedback were conducted through the discussion board feature in the LMS.

2. Each small group participating in peer feedback received three case materials and related assigned readings in the beginning of the week. Students were presented with the cases, related information, and guiding questions in the discussion board. All three students in the small groups were assigned cases (one case each student) based on alphabetical order of their names.

3. Students were expected to conduct research on their assigned cases prior to the in-class meeting and devise a treatment plan for the specific disease state of the patient, and post their report to the discussion board for their peers to review. The assignments needed minimal writing and mimicked SOAP (subjective, objective, assessment, and plan) notes (Nicholl & Lou, 2012).

4. Students were expected to review their peers’ work and provide constructive feedback on the discussion board prior to the in-class meeting. Each student reviewed two of their peers’ reports on the cases and provided feedback using the discussion board.

5. Each participating student received two sets of feedback on their own assigned case and were encouraged to evaluate the strength and weaknesses in the feedback they received. They were also expected to complete the feedback evaluation form available in the discussion board after reviewing their peers’ feedback.

6. In the class, during the first half of the class time, students engaged in discussions related to the patient cases in their small groups. During the second-half of class
time, the facilitator presents expert decision-making process of the assigned cases to help students reflect/compare their own understanding of the case with that of expert decision making.

7. The peer feedback activity was not a graded assignment, although it was required of all students. Students who did not participate in the peer feedback activity completed all three patient cases on their own.

**Rationale behind the different components of the activity.** The following are several research findings that were taken into consideration in the designing of the peer feedback activity. It is expected that these components of the activity supported through previous research helped make the activity stronger and contributed towards its validity.

For effective functionality of team and desirable learning outcomes grouping students into teams is an important factor (Farland et al., 2013). Pharmacy students in this university are randomly grouped into 5/6 students in the beginning of the year. Farland and colleagues (2013) found that students working together for the duration of the semester or even for an entire year promotes cohesiveness and optimal team performance. The researchers for this study divided the group of six into two groups of three students for convenience of peer feedback. Research further recommends steps to avoid formation of sub groups by separating couples, or members who are otherwise socially connected with each other (Nicholl & Lou, 2012).

Involving the students in constructing peer feedback criteria has been linked to promoting student engagement in learning process, in addition to the benefits of skill development associated with giving and receiving constructive feedback (Heylings & Stefani, 1997). Although in this peer feedback activity students were not required to construct their own
feedback criteria due to limited time, students were provided with guidelines to help them provide constructive feedback to their peers.

Research in the field of education and health professions indicate that lack of training in providing constructive feedback is one of the major concerns among students which undermines their ability to provide feedback to their peers (Gielen, Peeters, Dochy, Onghena, & Struyven, 2010; Prins, Sluijsmans, & Kirschner, 2006; van Zundert, Sluijsmans, van Merriënboer, 2010). Therefore, in this activity students had the opportunity to access training materials in a specific folder in the LMS.

Peer feedback activities require students to engage in complex cognitive processes such as monitoring and assessing their own and peers’ performances as well as evaluating and reflecting on the feedback received, thus necessitating sufficient time to observe effects of such activities (Phielix, Prins, Kirschner, Erkens, & Jaspers., 2011). Other researchers have also reported failure to see any impact of peer feedback due to shorter length of peer feedback activity (Kamp et al., 2014; Tsai, Lin, & Yuan, 2002). In the present study, students engaged in three rounds of peer feedback at different time points within the semester.

Prior to the actual peer feedback process, students had the opportunity to go through pilot marking which is the practice of grading sample pieces of work, similar to what students were required to complete for their assignment (Kearney, 2013). By participating in the pilot marking process, it was anticipated that, students will be better prepared to provide constructive feedback to their peers. Students also had access to sample papers with feedback by the instructors for guidance.

Peer feedback has been implemented in a valid way in CBL environment (Ferguson & Kreiter, 2007). The cases were designed to facilitate discussions and cover key learning
objectives. The learning issues that students generated for self-directed study provided an opportunity to compare the groups’ objectives to that of instructor, the variability among different groups as they discussed the same cases, and the potential of the case in generating important learning issues of the core contents of the course (Duek, Wilkerson, & Adinolfi, 1996).

Although anonymity in peer feedback is considered important (Kearney, 2013; Zariski, 1996), there are mixed results in pharmacy research. In a study by Wu, Davison, and Sheehan (2012) 71% of the pharmacy students rated anonymity in providing and receiving peer feedback as an important component. However, in research by Theising, Wu, and Sheehan (2014) only 40% of the pharmacy students considered anonymous feedback by a peer to be more meaningful than an identified peer. Since in our study students worked in a small-group setting, it was logistically not possible to maintain anonymity. One potential disadvantage of not having anonymity which might impact the validity of peer evaluation is that students may under or over rate their peers based on personal relationships (Kao, 2013). To counter the issue of overrating or inflation of grades, Ferguson & Kreiter (2007) suggested instructing students to assign a maximum score to no more than two of their peers. Since in the present study, peer feedback activity was not graded, the above-mentioned grading system was not implemented.

Peer feedback requires interaction among students, and interrelationship between the assessor and assesse could determine the effectiveness of peer feedback (Bok et al., 2013; Chou, Masters, Chang, Kruidering, & Hauer 2013). Although students seem conflicted as to whether having a prior relationship helps them in exchanging feedback with their peers (Wu et al., 2102), they realize that reporting their peers’ professional behavior would affect their relationship with their peers (Arnold et al., 2007). Students refrain from negatively grading their peers if they know that their scores might have adverse effect on their peers’ grades (Ferguson & Kreiter,
Further, although students value peer feedback, research suggest that students do not like to be graded by their peers (Boud, Cohen, & Sampson, 1999; Tusi & Ng, 2000). To counter this issue, the peer feedback process was formative and students’ evaluations of their peers’ feedback was for research purposes and was not factored towards their grades.

**Research Instruments**

*Effectiveness of Peer Feedback Evaluation*

To collect students' perceived effectiveness of the peer feedback received, an adapted version of the Feedback Perception Questionnaire (Strijbos, Narciss, & Dünnbier, 2010) was used. The Strijbos et al., (2010) developed the survey to investigate how feedback content and sender’s competence level affected feedback perception and performance of teacher training in psychology students. The authors used data from 89 participants to validate the Feedback Perception Questionnaire. The original questionnaire consists of an 18-item scale measuring four aspects of feedback perception: Willingness to Improve ($R^2 = .09$, Cronbach’s $\alpha = 0.82$), Positive Affect ($R^2 = .11$, Cronbach’s $\alpha = 0.90$), Negative Affect ($R^2 = .15$, Cronbach’s $\alpha = 0.83$), Perceived Adequacy of Feedback (PAF) ($R^2 = .35$, Cronbach’s $\alpha = 0.89$). Questionnaire items were measured using a 10-point scale from 0 (fully disagree to 10 fully agree).

Since the research requirement of the present study deals with effectiveness of peer feedback, students were asked to what degree the feedback they received was helpful to understand and helped them revise and improve their work. Thus, three items representing two factors of the original Feedback Perception Questionnaire (Strijbos et al., 2010) were included in the questionnaire (see Table 1). One item was included from Willingness to Improve factors, and two other items representing the factor Adequacy of Peer Feedback were included in the adapted questionnaire. Two questions on helpfulness of the feedback are also being added to capture
whether students agreed that the feedback helped them see the strengths and weaknesses of their work. These questions were adapted from a study with medical students’ perception of peer critique (Ahmed & Van Der Molen, 2010).

<table>
<thead>
<tr>
<th>Factors/Themes</th>
<th>Adapted questions</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helpfulness</td>
<td>Feedback was helpful to see the strengths of my work.</td>
<td>(Ahmed &amp; Van Der Molen, 2010)</td>
</tr>
<tr>
<td></td>
<td>Feedback was helpful to see the weaknesses of my work.</td>
<td>(Ahmed &amp; Van Der Molen, 2010)</td>
</tr>
<tr>
<td>Perceived adequacy of</td>
<td>Feedback was justified.</td>
<td>(Strijbos et al., 2010)</td>
</tr>
<tr>
<td>feedback</td>
<td>Feedback was adequate.</td>
<td>(Strijbos et al., 2010)</td>
</tr>
<tr>
<td>Willingness to improve</td>
<td>I would be willing to revise my work based on peer feedback.</td>
<td>(Strijbos et al., 2010)</td>
</tr>
</tbody>
</table>

Table 4.1: Effectiveness of Peer Feedback Evaluation Questionnaire

Students rated these five items in the adapted scale (See Appendix B) with a slider scale ranging from 0 (Strongly disagree) to 100 (Strongly agree). Negative phrased items are recoded so that the scale measured positive affect. Reliability analysis of the updated questionnaire showed a moderate test-retest reliability (.67 across 3 weeks) and (α = .89) indicating high internal consistency among items.

**Reflection in Learning Scale (RLS)**

The research instrument Reflection in Learning Scale (RLS) developed by Sobral (2000) was used to assess the reflective thinking skills among students (See Appendix C.1). The author views reflection as a cognitive regulation strategy that can be represented by a repertoire of cognitive behaviors (Sobral, 2005). The scale was developed to assess medical students’ self-reflections during learning. We used this scale for two reasons; first, since pharmacy students are future healthcare professionals, a scale that is validated on medical students would be appropriate. Second, RLS focuses on the process of reflection and not the content (Sobral, 2005), and in line with Schön (1987), the scale measures reflection as a cognitive regulation strategy.
(Heinerichs, Vela, & Drouin, 2013). The RLS is a self-report questionnaire. Factor analysis of the scale revealed two related underlying dimensions, integration and monitoring of learning. The scale showed good internal consistency ($\alpha$ range = 0.84-0.88, $r$ = 0.709), and validity ($R^2$ = 0.547) when administered to medical students (Sobral, 2000, 2005). In this 14-item scale, each item is appraised through a 7-point response scale ranging from ‘never’ = 1 to ‘always’ = 7. The items focus on reflective learning, for example, (1) Carefully planned my learning tasks in the courses and training activities of the medical program; (2) Mentally processed what I already knew and what I needed to know about the topics or procedures. The instrument also includes a four-point global scale designed to assess personal efficacy for reflection in learning. The personal efficacy item ranged from restricted (requiring maturation, incentive, training, and feedback for developing efficacious self-reflection) to maximal (capable of efficacious self-reflection even under constraining conditions of time and context). The RLS score ranges from 14 to 98. Permission was obtained from the author as well as the Copyright Clearance Center to use the instrument (See Appendix C.2).

**Results**

Twenty students completed the peer feedback activity. All quantitative data analysis was done using SPSS v.29. The mean score and standard deviation for RLS were found to be 77.4 and 11.27 respectively. Descriptive statistics for the RLS is presented in table 4.2. The mean and standard deviation of the Effectiveness of Peer Feedback Evaluation Questionnaire was found to be 79.0 and 13.9 respectively. Contrary to expectations, Pearson correlation revealed a non-significant ($\alpha$ = -0.25) correlation between effectiveness of peer feedback and reflective thinking scores among pharmacy students. Twenty-five percent of the students reported having maximal, and seventy percent reported ample personal efficacy. One participant did not indicate personal
efficacy level. No students reported partial or restricted personal efficacy. Stronger self-efficacy was associated with higher reflection scores.

<table>
<thead>
<tr>
<th>Items</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carefully planned my learning tasks in the courses and training activities of the pharmacy program.</td>
<td>4</td>
<td>7</td>
<td>5.70</td>
<td>.801</td>
</tr>
<tr>
<td>Talked with my colleagues about learning and methods of study</td>
<td>3</td>
<td>7</td>
<td>5.45</td>
<td>1.146</td>
</tr>
<tr>
<td>Reviewed previously studied subjects during each term.</td>
<td>3</td>
<td>7</td>
<td>5.40</td>
<td>1.188</td>
</tr>
<tr>
<td>Integrated all topics in a course with each other and with those of other courses and training activities.</td>
<td>4</td>
<td>7</td>
<td>5.40</td>
<td>1.142</td>
</tr>
<tr>
<td>Mentally processes what I already knew and what I needed to know about the topics and procedures.</td>
<td>4</td>
<td>7</td>
<td>5.85</td>
<td>.933</td>
</tr>
<tr>
<td>Been aware of what I was learning and for what purposes.</td>
<td>4</td>
<td>7</td>
<td>5.80</td>
<td>1.056</td>
</tr>
<tr>
<td>Sought out interrelations between topics in order to construct more comprehensive notions about some theme.</td>
<td>4</td>
<td>7</td>
<td>5.58</td>
<td>.902</td>
</tr>
<tr>
<td>Pondered over the meaning of the things I was studying and learning in relation to my personal experience.</td>
<td>3</td>
<td>7</td>
<td>5.65</td>
<td>1.089</td>
</tr>
<tr>
<td>Conscientiously sought to adapt myself to the varied demands of the different courses and training activities.</td>
<td>4</td>
<td>7</td>
<td>5.85</td>
<td>1.040</td>
</tr>
<tr>
<td>Systematically reflected on how I was studying and learning in different contexts and circumstances.</td>
<td>4</td>
<td>7</td>
<td>5.85</td>
<td>.875</td>
</tr>
<tr>
<td>Mindfully summarized what I was learning day in, day out, in my studies.</td>
<td>3</td>
<td>7</td>
<td>5.10</td>
<td>1.294</td>
</tr>
<tr>
<td>Exerted my capacity to reflect during a learning experience</td>
<td>3</td>
<td>7</td>
<td>5.45</td>
<td>1.276</td>
</tr>
<tr>
<td>Diligently removed negative feelings in relation to aims, objects, behaviors, topics or problems pertaining to my studies.</td>
<td>3</td>
<td>7</td>
<td>5.20</td>
<td>1.196</td>
</tr>
<tr>
<td>Constructively self-assessed my work as a learner.</td>
<td>3</td>
<td>7</td>
<td>5.40</td>
<td>1.046</td>
</tr>
</tbody>
</table>

Based on a 7-point response scale ranging from ‘never’= 1 to ‘always’ = 7

Table 4. 2: Reflection in-Learning Scale Summary

Qualitative interview data revealed three major themes regarding PharmD students’ perception of peer feedback as an instructional strategy in promoting reflective practice, namely, (1) cognitive process of providing feedback, (2) cognitive process after receiving peer feedback, and (3) perception of peer feedback as a tool to exercise reflective practice.
**Cognitive process of providing feedback.** Students generally had positive views regarding the benefits of peer feedback as an instructional strategy. All participants described a more or less similar process of providing feedback to their peers on their patient-specific treatment plans. In describing the process of providing feedback, one participant responded,

It’s definitely like switching your frame of mind to review each different case. So I make sure I have the book, then read the case and formulate my answers, think what I would say to those questions. Then thoroughly read their answers to see if anything they missed or anything else should be included in their answer, I could suggest and include it.

All participants discussed formulating their own answers to their peers’ assigned cases first, and then compared it to their peers’ responses before providing feedback. This is evident from the following response from another participant.

I think in my head, so if this person’s answers were not written, what would I be writing. And then, looking and comparing what they actually have written, and the details that they provided with it and then see if they covered all the bases that we need to cover when we are answering a case. I try to compare it with past cases that we have been given, that we have done in class, and um, kind of go through a checklist.

The interviews revealed that, before providing feedback on their peers’ assigned cases, students read, understand and formulate their own responses to the questions. They evaluate their peers’ answers by comparing it to their own, and compose their feedback either by agreeing or disagreeing to the answers. One participant shared that the disagreements are generally accompanied by justifications.
**Cognitive process after receiving feedback.** All five interview participants reported learning a different perspective on the case and improving their work as a result of peer feedback. As one participant shared,

I appreciate it, because it helps me learn more, because I realize, I can go back and look at it more because I didn’t think of it hard enough or I didn’t look at it from that perspective. Or when they completely disagree, in one instance, when I was completely wrong, and I didn’t notice and I got very constructive criticism, and I went back and looked at my book and I was like, oh yes, you’re right, you know.

One student talked about implementing peer feedback and transferring of learning from feedback in one case to different future cases and stated,

When I read their feedback, I think oh I missed that, and try to think why I missed that and how I can make sure to not miss that again in another situation in another case. As far as positive feedback goes, (you did an awesome job) I try to go back and look what I did and make sure to remember that I include/look for these factors.

Another participant shared that “I look at their feedback and then I look at my case, and I read through it and I look for their suggestions to see if I could improve on my work”. At least one student talked about critically evaluating peer feedback before implementing the feedback, “first of all I make sure that their responses are accurate, and I make sure that it is true information and they are giving me a different view of something then I think how I can change my work to better reflect their point of view”. One participant emphasized the importance of justification in peer feedback and stated that,

I go back to see if I am right or am wrong, but in most cases, it is not about right and wrong it is about how detailed your answer is. So the instance when I was completely
wrong, you know it made me do more research on that particular question. So in the feedback, I am looking at whether I am right or wrong and if I am wrong, why. So a lot of time, I have really good feedback, and they would justify their answers. So that’s what I am looking for, did they agree or disagree and what is their justification for that.

In describing how students use and implement peer feedback, interview participants mostly focused on learning a different perspective on a patient case from peer feedback as well as improving their current or future work.

Perception of peer feedback as a tool to exercise reflective practice. None of the five participants interviewed had prior experience with peer feedback in a way they were required to critically evaluate a peers’ work and provide feedback on that. Interviews also revealed a certain degree of apprehensiveness among students in participating in a collaborative peer feedback activity in the beginning of the year with a new group of students. This apprehensiveness was evident in the following comment by a student who stated “Also, with this being our first time in class, you know structured, and intense, we are trying to pull all our knowledge that we gained in pharmacy school so far into one course, and do well on it”. To the question, “your curriculum is changing towards incorporating reflective practice, do you think peer feedback could be a step towards that, if yes, how?” students mostly talked about benefits of group work and multiple perspectives in managing medications for patients (See Appendix D).

Four out of five participants discussed collaboration with peers and improving their own work as advantages of peer feedback. One participant shared “with the new curriculum we are trying to focus more on the critical side and being able to practice what we learn in school… …I think peer feedback can help you learn how to better perform in a group and also how to improve your own work”. Students seem to realize that the ability to work well in a group is a critical
aspect of preparing themselves for future professional practice, as well as improve their current learning outcomes.

All five participants realized that they will be using peer feedback in some form in their future careers as pharmacist, as it is evident from the following statement from one participant.

In my future career, I have to work with other pharmacists and potentially other doctors and nurses and bunch of other healthcare workers and you kind of be respectful to them but then you should be able to give constructive feedback to them, you will be discussing case with them, or if they come up to you with questions, this is my opinion and this is why it is my opinion, talk to them and kind of give them your feedback why or why.

Another participant focused on the advantages of multiple perspectives in workplace and stated that,

I want to hopefully work in a hospital pharmacy one day, I think the whole system is set up to be peer feedback, almost like a feedback loop in the whole hospital, with pharmacists, doctors and nurses. Multiple perspectives will help save lives, because you can come up with medication that you didn’t even consider.

Although all five participants talked about advantages of collaboration and group work in peer feedback, one participant described how peer feedback can help students reflect on their work to improve patient outcomes.

I feel like when you go and discuss a case with the group, you’ve already looked at the case for yourself and you already have an idea what you would do and why you would do it. So I feel like in a way, peer feedback contributes to that. What you would do and why you would do it and sit down and discuss it with other people why they would do something different and then you can come to a medium where you can see what each of
you might have missed which could result in a completely different outcome than each of you have it originally.

Interview participants did not specifically address how peer feedback could be a tool to exercise reflective practice; however, all of them emphasized the benefits of group work, discussions, and multiple perspectives on patient cases as important implications of peer feedback for their learning outcomes and future careers as pharmacy professionals. The peer feedback activity enabled them to pause and look back at the strengths and weaknesses of their own work to see how they can improve their work.

**Discussion**

The present study explored the relationship between the use of peer feedback activities and the development of reflective practice with second-year pharmacy students. Although our data is limited to a small group of students, the nature of the activity and learner outcomes we studied supported the smaller sample. While not generalizable, the results provide important insights about how to design, deliver, and evaluate peer feedback activities.

ACPE (2016) guidelines on reflective practice have generated interest on a variety of teaching and learning strategies to enhance reflective practice in pharmacy curriculum. A key element of reflective practice is the ability to employ multiple perspectives of a given situation to support better decision making (Tsingos et al., 2014). All five interview participants emphasized that they gained multiple perspectives through the peer feedback activities, which helped them make informed decisions about their patient cases. They were encouraged to question their own assumptions in light of additional or alternative perspectives. Our qualitative data corresponds with findings from previous studies showing that students engage in cognitive processes such as planning, critical thinking, and reflection when involved in peer feedback activities (Lin, Liu, &
Yuan, 2001). Our students found working in groups, peer discussions, and learning different perspectives on a patient case to be the most helpful aspects of a peer feedback. Although important, these reflect a limited view of the potential benefits of peer feedback. One possible explanation of this could be a lack of awareness among students on the learning benefits of peer feedback, such as practice of critical thinking and self-assessment skills (Topping, 1998), as well as peer feedback as a promoter of interprofessional skills (Kritikos, Woulfe, Sukkar, & Saini, 2011; Wu et al., 2012). Introducing reflective activities such as peer feedback in the beginning of the PharmD program or even in undergraduate pharmacy may enhance student awareness and understanding of such innovative instructional strategies (Kanthan & Senger, 2011). Researchers also suggest explicitly discussing the benefits of such self-directed activities may increase the acceptance of students towards instructional modifications (Keeney-Kennicutt, Gunersel, & Simpson, 2008).

Although we did not examine the motivational factors of students to determine their willingness to participate in a new instructional strategy, it is noteworthy that these introductory class students voiced disappointment that the peer feedback activity did not carry any incentives in the form of extra credit. There is a general acknowledgement that assessment drives learning (Epstein, 2007). Further, research suggests that students work harder for tasks that are assessed and carry a grade compared to tasks that do not (Bourner, 2003). Since the peer feedback activity was not mandatory, most students did not want to participate in the “extra workload.”

The fact that only about one-fifth of students were willing to participate in the peer feedback activity reveals limited engagement among students to some extent. Research by Arum and Roksa (2011) suggested that college students do not acquire critical thinking skills, complex reasoning, and writing skills at levels expected by educators. Since many innovative instructional
activities represent a push toward self-directed learning and a more active role for students, students may even resist the idea, as it requires a paradigm shift in their perception of and experiences with learning (Akerlind & Trevitt, 1999).

The participants of this study were apprehensive about participating in a new instructional strategy. There are two possible explanations. First, participating students were working together as teams for the first time in their second-year of the program. Research on group dynamics suggests that optimal team performance requires a semester or even longer to develop (Farland et al., 2013). Since collaborative activities such as peer feedback, requires students to be dependent on each other, unfamiliarity with group members, could have contributed to the decision not to participate in the activity or withdraw participation. Secondly, a lack of experience with peer feedback or similar practices during undergraduate and graduate years could contribute to students’ uncertainties. This sense of apprehensiveness has also been observed in previous studies on reflective practice (e.g., Embo, Driessen, Valcke, & Van der Vkeuten, 2014; Tsingos-Lucas et al., 2016), where students reported reflective tasks to be challenging. However, similar to the present study, student perceptions in previous research studies suggest that, despite this uncertainty, students who participate in reflective exercises acknowledged it to be valuable learning experience (Embo et al., 2014; Tsingos-Lucas et al., 2016).

Certain design and procedural changes might impact on the degree of participation and feedback exchange experienced by students. Participants used the discussion board feature in eLearning Commons LMS to exchange feedback. Students could access all the case materials in the discussion board, however, they had to open multiple pages to provide feedback, and to
evaluate their peers feedback. Although the system worked, an integrated peer feedback tool would have allowed greater flexibility.

Training in providing constructive feedback has been widely researched in the field of peer evaluation and findings suggest that training is helpful not only to improve peer-assessment skills (Sluijsmans & Prins, 2006), but it can also enhance the quality of one’s own work (Lu & Zhang, 2012). However, due to limited time, no training was provided to our students, and although students had access to training resources on how to provide constructive feedback in LMS, most did not access these training materials.

The RLS scale (Sobral, 2000, 2005) used to gauge the reflective learning of students is an established instrument validated with medical students, but hasn’t been validated with pharmacy students. Although, medical and pharmacy education are related fields, important differences might exist in professional practice and pedagogy. The adaptive version (Wallman et al., 2008), of the Reflective Questionnaire created by Kember et al., (2000) can be substituted for RLS in future studies, as it was successfully adapted and validated with pharmacy students to assess their level of reflection.

The Effectiveness of Peer Feedback Scale indicated a moderate level of test-retest reliability ($r=.67$ across 3 weeks) with 18 participants, and adequate internal consistency ($\alpha = .89$). The five items in the EPF scale were derived from other scales measuring effectiveness of peer feedback. The criteria used for the scale were helpfulness (Ahmed & Van Der Molen, 2010), presence of justification (Gielen et al., 2010; Prins et al., 2006), adequacy of feedback (Sluijsmans et al., 2002; Strijbos et al., 2010), and willingness to improve (Strijbos et al., 2010). Although, the reliability analysis reported above, implies the instrument to be moderately reliable in the present form, the validity and utility of the instrument remains to be demonstrated. This
includes determining whether the items are related to factors such as constructiveness and quality of feedback. In future, research needs to be conducted to establish the construct validity of the scale by correlating it with similar scales and conducting an exploratory factor analysis to determine the underlying constructs of the scale.

Reflection and self-assessment are relatively new concepts under the umbrella of self-awareness, adopted by ACPE for continuous professional development in pharmacy education (Fjortoft, 2016). Although some schools have incorporated innovative learning methods to help students develop higher-order thinking and problem-solving skills, pharmacy schools across the nation still rely a great deal on didactic lecture (Roth et al., 2014). Additionally, the adequacy of our K-12 and higher education system in training students to effectively monitor their learning has been questioned (Allison, 2006; Janke & Tofade, 2015). Thus, a systemic change in thinking is necessary to orient both faculty members and students towards the standards required by ACPE. Allison (2006) suggested that faculty members in pharmacy schools can help students develop skills and attitude for self-directed learning in two critical ways. First, by structuring courses to engage and challenge students in various cognitive activities. Second, by exemplifying and modeling their own self-directed learning. Further, it is unreasonable to expect students learn these skills without the opportunity to practice them in class. Thus, we recommend that reflective practice activities be embedded in undergraduate and graduate curricula (Tsingos et al., 2014).

Future research could focus on refining the design of peer feedback activity and empirically examining whether peer feedback has an impact on the reflective practice skills and learning outcomes of students, compared to controlled conditions without peer feedback. Another recommendation for future research would be to do a content analysis of the feedback exchanged among students to determine the quality of peer feedback, and to investigate if there
is a relationship between feedback quality and levels of reflection among feedback providers. The requirements of several skills such as understanding of the goals of the activity, the ability to apply feedback criteria, as well as the ability to evaluate the strengths and weaknesses of feedback makes it a complex undertaking for many students (Hovardas et al., 2014). Thus, future research focused on student characteristics that contribute to a successful peer feedback activity may prove informative.

**Conclusion**

This study served as a starting point to explore peer feedback as a strategy to aid in reflective practice among pharmacy students, and underlines the importance of reflective activities to enhance the learning experiences of students as well as preparing them for lifelong learning. Overall, designing and implementing reciprocal feedback activities with an aim to allow students to practice reflective skills is a rather complex procedure and thus involves careful considerations. Important lessons were learned from the design, development, and implementation of this innovative instructional strategy to help improve future studies. Despite limited data, the present study provides an insight into the values and usefulness of peer feedback as an instructional strategy and stresses the arguments made by Liu and Carless (2006), supporting peer feedback as a learning tool that can help enhance critical thinking skills and aid in reflective practice. Peer feedback has proven valuable for students in various other fields (Eraut, 2004; Gordon, 2003; Mayo, Kakarika, Pastor, & Brutus, 2012; Wilkins, Shin, & Ainsworth, 2009), more research should be conducted to refine this educational strategy to better suit the needs, values, and outcomes of pharmacy education.
References


Wright, L., & Lundy, M. (2012). Blogging as a tool to promote reflection among dietetic and physical therapy students during a multidisciplinary international service-learning experience. *Journal of Allied Health, 41*(3), 73E-78E.

CHAPTER 5
CONCLUSION

The professional role of pharmacist has been changing to meet the dynamicity in their professional practice (Droege, 2003). This change of role to function as a healthcare professional requires pharmacists to reevaluate their professional knowledge and adept their skill sets to the meet the needs of individual patients (Strand, Cipolle, Morley, & Frakes, 2004). Reflecting upon one’s experiences to gain an understanding of the role of pharmacy profession in the entire healthcare system is believed to be a crucial aspect of preparing pharmacists as healthcare professional (Wallman, Lindblad, Hall, Lundmark, & Ring, 2008). As stated by Droege (2003): “In order for pharmacists to partake in truly interdisciplinary healthcare teams and the profession of pharmacy to demonstrate its unique and indispensable contribution to quality healthcare, pharmacy curricula would teach towards reflective practice...” (p. 68). Thus, there is a growing focus on integrating reflective practice activities into pharmacy curriculum to help prepare pharmacy professionals for the challenges of professional clinical practice (Tsingos, Bosnic-Anticevich, & Smith, 2014).

Several reflective exercises have been used in clinical education to promote reflective practice. For example, portfolios (Goodyear, Bindal, & Wall, 2013; Plaza, Draugalis, Slack, Skrepnek, & Sauer, 2007), blogging (Dunne, & Ryan, 2016; Wright, & Lundy, 2012), and reflective journaling (Bouldin, Holmes, & Fortenberry, 2006; Fischer, Haley, Saarinen, & Chretien, 2011) have been used to enhance reflective capacity among students. Although peer assessment and feedback has been used in healthcare education to promote reflection among students (Hulsman, Harmsen, & Fabriek, 2008; Sargeant, Mann, Sinclair, Van der Vleuten,
Metsemakers, 2006), there is limited evidence-based research on peer feedback in pharmacy education.

The overarching aim of this dissertation was to conceptualize peer feedback process, and design, develop, and implement a peer feedback activity to help promote reflective practice among pharmacy students. This chapter provides discussions and limitations of the studies conducted and outlines implications this research may have on theory and practice in the field of peer feedback. Finally, recommendations for future research are included.

Chapter 2 explores the theoretical foundations of peer feedback and describes the cognitive and metacognitive processes involved in peer feedback to build a conceptual framework. Further, relevant literature is synthesized to identify factors that impact the effectiveness of peer feedback practices. Finally, instructional guidelines are offered to help researchers design effective learner-centered peer feedback activities. The conceptual framework presented in chapter 2 was employed in the two subsequent studies, serving as the basis of the survey to identify the factors that influence the decision to participate in peer feedback activities among pharmacy students (Chapter 3); and designing and implementing a peer feedback activity to enhance reflective practice among pharmacy students (Chapter 4).

The study described in chapter 3 was conducted to gauge the perceptions and attitudes of pharmacy students towards peer feedback in a pharmacotherapy course. An explanatory sequential mixed-method approach with a 20-item electronic survey and semi-structured interviews were used to collect data from second-year PharmD students. Descriptive statistics were calculated for the survey data and interviews were analyzed using constant comparative approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Findings suggest that majority (90%) of students preferred instructor feedback to feedback received from peers. More students
(90%) agreed that their peers are competent enough to provide constructive feedback, whereas only 78% believed in their own competency to provide feedback to their peers. Over 81% of students preferred receiving feedback from a peer they have previously worked with, and only 57% of students agreed that they would accept feedback from a peer that they haven’t previously worked with. Results indicated that perceptions of competency, the perceived value of peer feedback, and interrelationship among peers are important determinants of students’ willingness to participate in peer feedback.

Chapter 4 describes the design, development, and implementation of a peer feedback activity to explore the relationship between effectiveness of peer feedback and reflective practice among second-year pharmacy students. This study was based on the conceptual framework presented in chapter 2. An explanatory-sequential mixed-methods design was used with a correlational design and constant comparative approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Data was collected from second-year PharmD students using Effectiveness of Peer Feedback Questionnaire developed by the researchers and Reflection-in-Learning Scale developed by Sobral (2000). Although, limited data in the study made it difficult to derive concrete conclusions regarding the relationship between peer feedback and reflective practice skills among pharmacy students, valuable lessons were learned on how to improve the design, delivery, and evaluations of peer feedback activities. Interviews with participants revealed that students learned multiple perspectives by engaging in peer feedback and data also confirms findings of previous studies that students engage in cognitive processes such as planning, critical thinking, and reflection while involved in a peer feedback activity (Lin, Liu, & Yuan, 2001). Further, qualitative data revealed that, students find working in a group, discussions with peers,
and learning different perspective on a patient case to be the most helpful aspects of peer feedback activity.

This dissertation study explored the role of peer feedback as an instructional strategy and demonstrated the pedagogical value of peer feedback not only in enhancing the learning experiences of students, but also to preparing them for life-long learning.

Limitations and Future Research Directions

Given this dissertation study is an initial step towards exploring peer feedback as a strategy to aid in reflective practice of pharmacy students, there are several limitations and issues that need to be considered in future studies.

This study used a mixed-methods research design, thus, it is important to recognize potential threat to the internal and external validity. Since a mixed-method study combines complementary strengths and non-overlapping weaknesses of both quantitative and qualitative research methods, assessing validity can be complex (Onwuegbuzie & Johnson, 2006). According to Gall, Gall, and Borg (2007) internal validity refers to the extent that extraneous variables or variables that are not included in the study have been controlled so that the findings can be attributed solely to the intervention. Tashakkori and Teddlie (1998) also asserted that the conclusion regarding the relationship between variables can be said to have internal validity if the researcher is confident that the obtained relationship is real and not as a result of extraneous variables. Since the design of the present study includes peer feedback activity in which participants had access to a training module on how to provide constructive peer feedback, as well as engaged in writing three rounds of peer feedback, threats to internal validity is a concern. Since a non-experimental design with non-random sampling procedure was used for the present
study, I as the researcher must be my “own most trenchant critic” to minimize the threats to internal validity (Cook & Campbell, 1976, p. 229).

Literature suggests several procedures that can be applied in qualitative research to enhance the trustworthiness of the study’s findings. The most widely used are prolonged engagement with data and persistent observation, methodological and data collection triangulation, thick description, peer debriefing, researchers’ biases, and member checks (Glesne, 2011; Lincoln & Guba, 1985; Tashakkori & Teddlie, 1998). Three of these were used in this study, namely, long-term observation, member checks and the stating of the researcher’s biases.

According to Parker (1990), external validity refers to the “degree to which research findings can be generalized across time, settings, and persons” (p. 615). This research was conducted at a single pharmacy school in southeast United States; with convenience sampling of PharmD students in a required pharmacotherapy course. The findings of the study, therefore, can be generalized to the sample and setting of this study only. To enhance the generalizability of the findings, future studies may be conducted across regions, institutions, learning environments, and grade levels.

Secondly, although valuable lessons were learned on how to improve the design, delivery, and evaluations of peer feedback activities, limited sample size in chapter 4 study undermines the findings of the study. The sample size of chapter 3 survey is also relatively small, which affects the potential for generalization of survey findings. Qualitative components of these studies are also impacted by limited sample, which included only five interview participants. Although important data was collected during each interview, there is a chance that data saturation was not achieved through these interviews. A larger sample may have allowed for more diverse insights into peer feedback practices.
Thirdly, except for the Reflection-in-Learning Scale (RLS), developed by Sobral (2000), all other instruments used in these studies were developed by the researchers. Although the survey in chapter 3 is based on literature and the reliability analysis of the effectiveness of peer feedback scale was found to be moderate, yet the validity and utility of the instruments remain to be demonstrated. In future, research needs to be conducted to establish the construct validity of the scales by correlating them with similar scales and conducting an exploratory factor analysis to determine the underlying constructs of the instruments.

Finally, as with any set of data asking individuals to self-report, there is a risk that respondents answered based on their perceptions of social desirability, even though they were aware of the survey being anonymous. All these limitations need to be considered while interpreting the findings of the studies.

Future research could focus on refining the design of peer feedback activity and empirically examining whether peer feedback has an impact on the reflective practice skills and learning outcomes of students compared to controlled conditions without peer feedback. A future longitudinal study with a larger sample size, and student reaction both at the beginning and end of peer feedback activity could help determine students’ perception over time. Future studies could also focus on investigating the set of factors that best explain the perceived effectiveness of peer feedback. A last suggestion for future research would be to do a content analysis of the feedback exchanged among students to determine the quality of peer feedback and to investigate if there is a relationship between feedback quality and levels of reflection among feedback providers.

Although peer feedback in this dissertation has been considered primarily through a constructivist approach, it is important to acknowledge that there are many different ways of
explaining how adults learn (Knowles, 1988; Merriam, Caffarella, & Baumgartner, 2007).

Research suggests that adult learners differ from child learners in six different ways, namely, the need to know, learner’s self-concept, learner’s experience, learner’s orientation of learning and their motivation (Taylor & Hamdy, 2013). All these components are important while planning curriculum, or designing individual or group activities such as peer feedback for aspiring health professionals. Perry’s (1999) stage of duality also has important implications for planning curriculum for healthcare students. As suggested Taylor and Hamdy (2013), lectures and activities can reinforce a state of duality, which can help healthcare professionals deal with multiple perspectives and uncertainties and can ultimately result in a shift to early multiplicity.

Peer feedback requires a complex set of abilities of the participants for successful learning outcomes. Further research needs to be conducted on applying elements of adult learning theories to strengthen the process and implementation of peer feedback activities.

Instructors wishing to implement peer feedback in class should consider the following recommendations. Design and implementation of collaborative activities such as peer feedback needs careful considerations. Most importantly, instructors implementing peer feedback in class need to create a trusting environment for students to exchange feedback in a formative manner. Training in peer feedback techniques is helpful for students, however, getting opportunity to practice innovative instructional strategies is essential in creating awareness among students to pursue self-directed, life-long learning (Tsingos et al., 2014). Perceived competency of peers and their own level of competency are reported to be important determinants of a successful peer feedback activity, therefore, instructors are recommended to involve students in constructing feedback criteria (Orsmond, Merry, & Reiling, 2002) and including those criteria to create a
feedback template (Gielen, Tops, Dochy, Onghena, & Smeets, 2010) to counter the issues associated with perception of lack of competency.

A systemic change is necessary to orient both students and faculty members towards these instructional modifications mandated by accreditation standards. Commitment to self-directed life-long learning necessitates curricular changes; and it is also essential to align contents, activities, and assignments with these mandated standards. Students need to be aware of the benefits of these self-directed activities (Keeney-Kennicutt, Gunersel, & Simpson, 2008), and get enough opportunities to practice these skills in the beginning of their undergraduate program to help prepare them for self-directed life-long learning.
References


Wright, L., & Lundy, M. (2012). Blogging as a tool to promote reflection among dietetic and physical therapy students during a multidisciplinary international service-learning experience. *Journal of Allied Health, 41*(3), 73E-78E.
APPENDIX A.

FACTORS INFLUENCING PEER FEEDBACK SURVEY

<table>
<thead>
<tr>
<th>Factors Influencing Peer Feedback Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowing the goals of peer feedback activity is important to me.</td>
</tr>
<tr>
<td>2. Getting training on providing feedback is important to me.</td>
</tr>
<tr>
<td>3. I prefer teacher feedback to peer feedback.</td>
</tr>
<tr>
<td>4. The negative comments I receive from my peers are always accompanied with justification.</td>
</tr>
<tr>
<td>5. The quality of peer feedback is more important to me than knowing who provided the feedback.</td>
</tr>
<tr>
<td>6. Having a clear objective helps me in the exchange of peer feedback.</td>
</tr>
<tr>
<td>7. I feel competent enough to evaluate my peers' work even without training.</td>
</tr>
<tr>
<td>8. The peer feedback I receive are specific to the issues in my work.</td>
</tr>
<tr>
<td>9. Having a rubric is important to understand the requirements of peer feedback.</td>
</tr>
<tr>
<td>10. My peers are competent enough to provide me with constructive feedback.</td>
</tr>
<tr>
<td>11. Knowing how to provide constructive feedback will be helpful in my future career.</td>
</tr>
<tr>
<td>12. Working relationships with peers or the absence of it does not impact my acceptance of peer feedback.</td>
</tr>
<tr>
<td>13. Having a rubric helps me evaluate the strength and weaknesses of my peers' work.</td>
</tr>
<tr>
<td>14. I value peer feedback as much as instructor feedback.</td>
</tr>
<tr>
<td>15. The feedback I receive from my peers are of high quality.</td>
</tr>
<tr>
<td>16. I prefer feedback from a peer that I have previously worked with.</td>
</tr>
<tr>
<td>17. I believe peer feedback/assessment is a skill I will use in my pharmacy career.</td>
</tr>
</tbody>
</table>
Q5 Have you had prior experience with peer evaluation?

- Yes
- No

Q6 If Yes, how do you perceive peer feedback activities in general?

- Positive
- Negative
- Neutral

Q3 How do you describe yourself?

- Male
- Female
- Transgender
- Do not identify as male, female, or transgender
### APPENDIX B.

**EFFECTIVENESS OF PEER FEEDBACK EVALUATION QUESTIONNAIRE**

<table>
<thead>
<tr>
<th>Questionnaire Items</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback was helpful to see the strengths of my work.</td>
<td>0 (<em>Strongly disagree</em>) to 100 (<em>Strongly agree</em>).</td>
</tr>
<tr>
<td>Feedback was helpful to see the weaknesses of my work.</td>
<td>0 (<em>Strongly disagree</em>) to 100 (<em>Strongly agree</em>).</td>
</tr>
<tr>
<td>Feedback was justified.</td>
<td>0 (<em>Strongly disagree</em>) to 100 (<em>Strongly agree</em>).</td>
</tr>
<tr>
<td>Feedback was adequate.</td>
<td>0 (<em>Strongly disagree</em>) to 100 (<em>Strongly agree</em>).</td>
</tr>
<tr>
<td>I would be willing to revise my work based on the peer feedback.</td>
<td>0 (<em>Strongly disagree</em>) to 100 (<em>Strongly agree</em>).</td>
</tr>
</tbody>
</table>
### Q1
**Your Initials (You will not be identified anywhere, this is for research purpose only)**

**Q2**
**Your Group #**

### Q8
**How effective was the FIRST Peer feedback you received?**

<table>
<thead>
<tr>
<th>Feedback Description</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback was helpful to see strengths of my work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback was helpful to see weaknesses of my work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback was justified.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback was adequate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would be willing to revise my work based on the peer feedback.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C.1

REFLECTION-IN LEARNING SCALE
**The Scale of Reflection-In-Learning**

Please answer the items below in relation to your learning experience in pharmacy program. Please click on the scale number closer to your behavior.

<table>
<thead>
<tr>
<th>To what extent have I:</th>
<th>[1= Never</th>
<th>7=Always]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Carefully planned my learning tasks in the courses and training activities of the pharmacy program</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>2 Talked with my colleagues about learning and methods of study</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>3 Reviewed previously studied subjects during each term</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>4 Integrated all topics in a course with each other and with those of other courses and training activities</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>5 Mentally processes what I already knew and what I needed to know about the topics and procedures</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>6 Been aware of what I was learning and for what purposes</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>7 Sought out interrelations between topics in order to construct more comprehensive notions about some theme</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>8 Pondered over the meaning of the things I was studying and learning in relation to my personal experience</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>9 Conscientiously sought to adapt myself to the varied demands of the different courses and training activities</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>10 Systematically reflected on how I was studying and learning in different contexts and circumstances</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>11 Mindfully summarized what I was learning day in, day out, in my studies</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>12 Exerted my capacity to reflect during a learning experience</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>13 Diligently removed negative feelings in relation to aims, objects, behaviors, topics or problems pertaining to my studies</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>14 Constructively self-assessed my work as a learner</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>15 Taking into account the perceptions previously referred, I consider that my personal skill or efficacy to practice the reflective process is:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ ] Restricted. I actually require extensive additional preparation (orientation, support, practice, and feedback.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ ] Partial. I just need incentives and opportunities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ ] Ample. I have autonomy under favorable conditions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ ] Maximal. I have full autonomy even under negative pressure (adverse context, no time).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C.2

PERMISSION AND COPYRIGHT TO USE RLS SCALE

Permission & Copyright to use RLS

Thu 10/29/2015 10:04 AM
Dejano Sobral dtsobral@netscape.net
Re: Request for permission to use Reflection-in-Learning Scale (RLS)

Dear Supriya,

Of course I allow you to use the RLS!
However, Blackwell (Wiley) is the copyright holder.
Please address your request to permissionsuk@wiley.com
Thank you for your interest.
Best wishes,

Dejano T. Sobral, MD
University of Brasilia

-----Original Message-----
From: Supriya Deepak Mishra <sdmishra@uga.edu>
To: dtsobral <dtsobral@netscape.net>
Sent: Thu, Oct 29, 2015 10:12 am
Subject: Request for permission to use Reflection-in-Learning Scale (RLS)

Dear Dr. Sobral,

My name is Supriya Mishra and I am a PhD student in the Department of Learning, Design, and Technology in the University of Georgia (UGA), USA. My research interest is on using peer feedback as a medium to enhance reflective thinking. I am working with pharmacy students here at UGA and planning to conduct a pilot study in January, 2016. I read your papers (An appraisal of medical students' reflection-in-learning) and (Medical Students’ Mindset for Reflective Learning: A Revalidation Study of the Reflection-In-Learning Scale) and think that RLS will be an appropriate instrument to measure reflective thinking among pharmacy students. I am requesting permission from you to use the scale for my pilot study as well as for my data
collection later next year. I would be grateful to you and it would be a great help in my research if you allow me to use RLS for my study.

Please let me know what you think. I appreciate your time.

Sincerely,

Supriya

Copyright Clearance Center

This Agreement between Supriya Deepak Mishra ("You") and Springer ("Springer") consists of your license details and the terms and conditions provided by Springer and Copyright Clearance Center.

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<td></td>
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</tr>
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<td>----------------------------------------------</td>
</tr>
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<td>Peer Feedback as a medium to enhance Reflective Thinking</td>
</tr>
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<td>Expected completion date</td>
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| Billing Address | Supriya Deepak Mishra  
United States  
Attn: Supriya Deepak Mishra |
| Total | 0.00 USD |
| Total | 0.00 USD |
APPENDIX D.

INTERVIEW PROTOCOL

Peer Feedback as a Medium to Enhance Reflective Thinking among Pharmacy Students

Hi,

My name is Supriya Mishra and I am a doctoral student in the Learning, design, and Technology program at the University of Georgia. I am conducting a research project on the peer feedback as a medium to enhance reflective thinking among students. Specifically, I am interested in exploring the cognitive and metacognitive processes students go through while engaged in a peer feedback activity. I am also interested in knowing how pharmacy students perceive the effectiveness of peer feedback activities in general. I appreciate you meeting with me today to talk about it.

The specific research questions I am exploring are:

- In what ways peer feedback activity is helpful in promoting reflective practice among pharmacy students?
- What factors influence pharmacy students’ participation and perceived value of peer feedback activities?

Before we begin the interview, I would like to remind you that, the information you share in the interview will be kept confidential as explained in the consent form. The interview will be audio taped and an identifier code will be assigned to the participant, once the interview is transcribed the recording will be destroyed. Please feel free to skip any question that you do not want to answer, and at any time you may end the interview. The interview will take approximately 12-15 minutes. Please feel free to ask any question during the interview. Do you have any question for me before we start the interview?

I would like to start our conversation by learning about your experiences in peer feedback practices in the classes you have taken. I have a few questions on your experiences and attitude towards peer feedback and the challenges you have encountered in the process.

1. Could you tell me about your experiences regarding the process of peer feedback activities in class?
   
   **Probing Question:**
   
   - Did you have any activities involving peer feedback in any of your classes prior to this? (if yes) - Describe your experience about the activity.
   
   What do you think the biggest hindrance to a successful peer feedback activity?
   
   What do you think the biggest gain from a peer feedback activity?
   
   How you might change anything, if you could?
2. Generally, what is your attitude towards peer feedback activities in class? And why?

3. Tell me about the cognitive process you go through when you are involved in a peer feedback activity.
   Probing Question: When you are providing feedback on a peer’s work what is the process you go through?
   Probing Question: When you receive feedback from your peer(s) what is the process you go through?

Transition: The last set of questions deal with your expectations from peer feedback and how you use or (plan to use) the feedback that you receive from you peer?

4. Tell me about your expectations from the feedback that you receive from your peers.
   Probing Question: In what ways receiving feedback from your peer is useful to you?
   How do you use it?

5. How do you think peer feedback process is helpful (if at all) to you in your learning outcomes?
   Probing Question: In what ways do you think peer feedback could help you towards learning the materials for the class?

6. Your curriculum is changing towards incorporating reflective practice, do you think peer feedback could be a step towards that? If yes, how?

7. What are some ways peer feedback practices can be useful to you in your future career?

Final Question: We went through a lot of questions on peer feedback practices, however, do you want to share anything that I might have missed?

Summary Statement: Throughout the interview I noticed several themes regarding peer feedback practices (include themes). Do you think it is an accurate representation of your experience?

Wrap-up: Thank you for sharing your experiences with me today. I appreciate your time and your valuable insights on peer feedback practices. If I have any follow-up questions later, may I contact you again?