

Learning With Reflection: Practices in an Osteopathic Surgery Clinical Clerkship Through an Online Module

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Context: The value of reflective practices has gained momentum in osteopathic medical education. However, the use of reflective pedagogies has not been explored in the larger context of medical course delivery and design, to the authors' knowledge.

Objective: To determine the types of reflection demonstrated by osteopathic medical students on an online discussion board and to explore differences in discussion engagement caused by the use of a reflective learning self-assessment tool.

Methods: Using a mixed-method approach, reflection processes in an osteopathic surgery clinical clerkship online module were investigated in third-year osteopathic medical students. Discussion board messages were captured and coded. Both manual coding techniques and automated interrogation using NVivo9 (a computer program) for qualitative data were applied. Correlations of scores across 4 case-based discussion tasks and scores for self-reflection were computed as quantitative data.

Results: Twenty-eight students were included. Four main types of reflection (ie, content, contextual, dialogic, and personal) along with corresponding differentiated subthemes for each type of case-based discussion board group message were identified. Group collaboration revealed insights about the reflection process itself and also about the evidence of collective efforts, group engagements, and intragroup support among students. Student preparation revealed that students' metacognition was triggered when they judged their own contributions to group work. Challenges in completing readings and meeting deadlines were related to the students' long work hours.

Conclusion: Reflective practices are essential to the practice of osteopathic medicine and medical education. Curricula can promote the development of reflective skills by integrating these deliberate practices in educational activities.

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In the 1930s, John Dewey, PhD, an American philosopher, psychologist, and educational reformer advocated the need for reflection in learning.^{1,2} Dewey valued experience as the source of long-term education over exposure to abstract knowledge, which was made evident by his observation: "We don't learn from experience. We learn from reflecting on experience."¹

Dewey identified reflection as a specialized form of thinking and linked it to critical thinking.² Although reflection is an essential attribute of competent health care professionals, adoption of reflective practices in medical education has been slow.³ Excellence in medical practice requires physicians to be reflective both scientifically and personally. Further, health care professionals have been urged to provide supporting information about their evidence-based reflective practices, which are now considered a formal requirement of the licensing

and recertification process.³ From this perspective, reflection is a critical component of developing expertise in health care professionals, and good learners are considered to be reflective learners.^{4,5}

We recognize the value of reflective practices and how crucial these practices are in the development of osteopathic physicians. The purposes of the present study were to (1) determine the types of reflection demonstrated by osteopathic medical students during an online component of a 8-week clinical clerkship in surgery and (2) note if administering a reflective learning assessment tool affected the group's discussion engagement and reflection.

Methods

This study was conducted at the University of North Texas Health Science Center Texas College of Osteopathic Medicine in Fort Worth. The institutional review board at the University of North Texas Health Science Center determined that the present study was exempt from full review.

We used a mixed-methods technique to explore evidence of reflection processes through Blackboard (Blackboard Inc), a Web-based learning management system. Participants were third-year osteopathic medical students in a required 8-week clinical clerkship in surgery. All students in the clinical clerkship were included in this blinded retrospective study. Students were assigned to 1 of 6 rotation blocks by computer randomization. They were unaware of the online clerkship curriculum and the present study when block assignments were made until the syllabus for the clerkship was distributed at orientation.

Instruments

Four cases with associated challenge questions were designed, and clinically relevant diagnostic and management tasks of increasing complexity were incorporated into each case for asynchronous discussion. The questions did not have singularly correct answers, but all responses were required to be supported by evidence of

best practices, if challenged. The clarity and accuracy of the questions were structured to align with the curriculum content objectives.

A reflective learning self-assessment tool was created specifically for this study to promote the application of metacognitive skills necessary for students to self-judge their performances on the group tasks. The learning tool comprised 7 statements to help students develop their self-awareness and reflective skills and 4 open-ended questions to obtain deeper information on how much and in what way students contributed to the weekly group discussions. The response to each of the 7 questions received a score weighted to reflect increasing levels of reflective practice.

A scoring rubric for the clerkship was provided to the students at the beginning of the clerkship. Points earned for the online module were determined on the basis of the level of online participation and timely completion of the reflective learning tool. Performance on the online module contributed 25% to the final clerkship grade.

Data Collection

The surgical clerkship lasted 8 weeks. Four weeks were spent on general surgery and 2 two-week periods on a surgical subspecialty selective. Students were assigned to 1 of 6 online discussion groups. Beginning in week 2, a challenge problem was posted to each group's discussion board. The stem was the same for all groups, but the problem itself was unique for each group. A total of 4 challenge problems were given in 4 consecutive weeks. Each group asynchronously conversed online to solve the problem and posted their solution to a common discussion board to receive comments from members of the other groups. Each student completed a reflective learning self-assessment survey after submitting their final assignment on each case. In this survey, students were asked to describe their preparation and performance on their first group project by discussing important contributions they made, restating an important idea or explanation expressed by their peers, and recalling engaging times and points of the discussion.

Data Analysis

The discussion board messages provided a rich data resource. A transcript of all messages posted by students in response to the clinical problems was captured from both group and general discussion boards in Blackboard. The originator of each message was blinded for coding purposes. A detailed systematic analysis using 2 independent methods—manual coding and automated analysis—was applied to interpret the data inductively and deductively.⁶

Analysis was performed by manual coding. Three types of coding proposed by Strauss⁷ and by Corbin and Strauss⁸ were used to analyze the discussion board messages. The coding included:

- **Open Coding:** Data were examined without limits in scope. Tentative categories were created by reading and rereading the message board posts.
- **Axial Coding:** Each category was analyzed to establish relationships between categories and links to subcategories.
- **Selective Coding:** A core category was selected and related to other categories to identify variations in a pattern of reflection (ie, themes).

NVivo9

The computer program NVivo9 (QSR International Pty Ltd) was used to generate reports and concept maps to describe intensity, trends, and patterns within a narrative of findings. Several steps were taken to prepare the data as files for coding: (1) the data were scanned to gain a sense of the overall content and tone, (2) the nodes were assigned (ie, coding terms) to each message or sentence to reflect themes emerging from the data, (3) the nodes were assessed for similarities or differences, and (4) the nodes were grouped into categories to reveal any interrelationships within the data.

Additional review of the coded data was completed by 2 coders to ensure accuracy and determine interrater reliability regarding the meaning and application of the codes. Qualitative data from the reflection tool were subject to the same data analysis.

The quantitative analysis included an evaluation of the statements on the reflection tool completed by the students as well as data from the discussion boards. A total score on the self-reflection tool was calculated by adding the scores on each item across 4 case-based discussion tasks. Also analyzed were the students' total scores for the module according to the published rubric, total messages on the discussion board, and students' group discussion and general discussion counts. The Pearson product-moment correlation coefficient was obtained to characterize the relationship among these quantitative results.

Results

The study cohort comprised 28 students aged 24 to 36 years, with a median age of 25 years. Of the 28 students, 9 were men and 19 were women. Reflections occurring in the discussion board messages were clustered into 4 main themes as determined by their frequency (*Table 1*). The incidence of personal reflection was the lowest except for the general discussion in project 1 (*Table 2*). Dialogic reflection consistently maintained lower variances among the 4 projects.

Total Message and Self-Reflection Scores

Students' total messages on the discussion board for the 4 cases was highly correlated with group discussion and general discussion counts with correlation coefficients of 0.70 ($P<.001$) and 0.65 ($P<.001$), respectively. Students' total scores for the module were correlated with the total messages on the discussion board, with a correlation coefficient of 0.56 ($P<.001$). Students' total self-reflection scores correlated with the group discussion, with a correlation coefficient of 0.46 ($P<.001$). The correlation coefficient for the general discussion was 0.19 ($P<.1$). These data suggest that engagement in the online dialogue was uniformly distributed between group and general discussion elements but was weakly correlated to scores obtained on the reflection tool.

Table 1.
Reflection Types Identified From Group Discussion
Board Messages Posted by Osteopathic Medical Students

Theme	Description
Content Reflection	Students focused on the content by providing references, description of a problem, or the details of the patient's medical situation.
Critical content reflection	Students questioned assumptions related to the scientific content and development of approaches to problem solving (ie, deconstructing the student's prior assumptions). Critical content reflection also showed a process of analyzing, reconsidering, and questioning experiences in a broad context of issues. Students shared a preliminary analysis of the patient's medical situation and context.
Reference-based (scientific) reflection	Students highlighted specific studies or research with the full citation or hyperlink.
Contextual Reflection	Individual students proposed cases and scenarios to capture their peers' attention by illustrating the relevance of the scenarios and a case in real-life situations.
Case-based reflection	Students used a case-based scenario to assess and analyze the problem and discuss possible solutions.
Scenario-based reflection	Students described a scenario to assess and analyze the present case and identify solutions.
Stimulated reflection ¹⁰	Students revealed thoughts and past experiences or memories during the learning process. Students mentioned actual experiences related to the case scenarios that would affect diagnosis and treatment.
Dialogic Reflection	Students created discourse to generate a set of desired outcomes for the case analysis. The language used by students implied further questions or approaches to solve the problem posed in the assignment, which nurtured further discussion or online interaction and thus created an internal and virtual conversation among peers.
Dialogic question-based reflection	Students posed questions and shared ideas to generate further conversations among peers and a focused conclusion. Online discussion threads revealed follow-up questions intended to explore additional options, collect more data, generate a diagnosis, and select appropriate treatment to complete the project.
Dialogic self-reflection	Students stated personal opinion or experience regarding the diagnosis or treatment with no medical evidence offered.
Dialogic critical reflection	Students shared vital information contributing to decision making and enabling the selection of diagnosis and treatment processes that would produce the best outcomes.
Personal Reflections	Students' personal reflections were traced with messages that reflected personal judgment, logical suggestions, values, and opinions, including unfocused or disorganized comments in relation to the assigned group tasks.
Descriptive reflection	Students proposed a rationale for the suggested diagnosis or treatment. Students also expressed an enhanced recognition of a rationale for decisions after some feedback or redirection from the instructor.
Process reflection	Students moved beyond the details to strategize on the options for data collection, diagnosis, treatment, monitoring progress, or patient well-being.
Mindful reflection	Students made logical suggestions articulating transferable insights for patient well-being.
Unfocused reflection ¹¹	Students provided answers that were posted without attempting to understand the case or the patient. The responses were disorganized and illogically expressed in assessing and analyzing the details of the weekly projects.

Reflection Tool Results

Of the 28 students, 17 (61%) completed all 4 reflection tools during the prescribed period immediately after the completion of each group project. The remaining 11 students (39%) either failed to complete all 4 tools or completed 1 or more tools after beginning work on the

subsequent module, which negated the determination of the impact the tool had on subsequent performance. With the exception of 1 response, all other responses indicated that reading assignments were completed or mostly completed before the group responses were posted to the general discussion board. Further, the 17 students who

Table 2.
Frequency of Reflection Types Demonstrated by Osteopathic Medical Students
in a Group and in General Discussion (N=28)

Reflection type	Project 1		Project 2		Project 3		Project 4	
	Group	General	Group	General	Group	General	Group	General
Content	21	42	28	30	5	21	4	12
Contextual	25	18	11	10	22	16	3	4
Dialogic	18	39	29	39	10	43	16	32
Personal	4	31	6	4	1	7	5	14

completed all 4 reflection tools reported that they searched the literature beyond the assigned readings to enrich their understanding of the topic covered in the pertinent week. However, in 15 of 68 completed tools (22%), students reported that they could have done a more extensive review of the literature to inform problem solving. In 58 of 68 completed tools (85%), students believed that they wrote thoughtful and meaningful comments for the discussion board activities.

Statistical differences among the 4 discussion projects were not evident. However, sharing ideas and offering suggestions to group members were the students' highest priorities (ie, community building). Of 68 responses, 50 (74%) indicated that students consulted with group members about their ideas during their group collaboration, and 24 of 68 responses (35%) indicated that although questions were posed to group members during that week's case challenge, more interaction could have been generated. Of 65 responses, 18 (26%) indicated that students gave little attention to this element during the reporting period for which the tool was completed. All students indicated that they demonstrated a positive attitude toward their group members while completing the group tasks.

Group Contribution and Student Engagement

Many students provided important ideas and explanations regarding case discussion assignments for the group work. These ideas and explanations touched on important overlooked medical or surgical information,

critical aspects of medical treatment decisions, and other compliance issues (eg, informed consent form).

Although some students specified their most engaging topics during the weekly assignments, their comments also revealed their engagement strategies, such as participating in the discussion board, reading comments, contributing to the continuous flow of ideas and suggestions, looking at cases from multiple perspectives, re-searching further information after receiving feedback from the group members, and receiving resource links or reference articles posted on the discussion board.

Analysis of the collaboration process to capture group dynamics revealed the following subthemes: (1) personal opinion, (2) intragroup praise, (3) progress updates, (4) group organization and management, (5) grammar correction, (6) ethics, (7) indirect questions, (8) defensive clarification, and (9) technical or software challenges.

Student Challenges

Some students expressed their frustrations and challenges in assignment deadlines because of their long work hours. They also found difficulties incorporating late comments from group members into the drafts and final version of the assignments. One student suggested spreading out the assignments during the week with different deadlines rather than having all projects due on Sundays. Another student explained that although the projects required a lot of time to complete, they helped students think like physicians, who must make the quickest and best decisions for each patient.

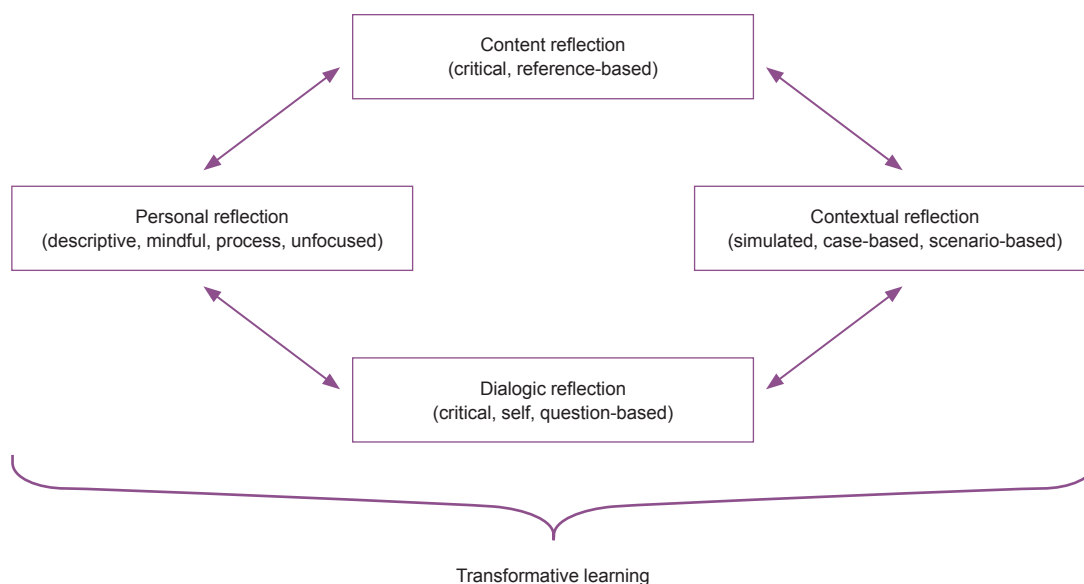


Figure.

Multilayer reflection learning model with both a vertical and iterative loop structure.

Complaints about the group work were few and included brainstorming constructive comments, working on the module platform, studying and taking practice questions, and having early exposure to the case discussion. Overall, students enjoyed their learning experience.

Discussion

Students may engage in different types of reflection during case-based discussion board activities. These types may be grouped into several main themes, and each theme may have corresponding subthemes. The present study identified 4 main themes (ie, content, contextual, dialogic, and personal). The groups' working processes showed 9 types of collaboration functions for creating a sense of community in an online environment.

Types of reflection have been theorized in many ways. The literature contains various models directed to promoting reflective thinking and practice. On the basis of experiential learning theory, Hutchinson and Allen⁹ developed the Reflection Integration Model to enhance reflective learning among students. This model com-

prises 4 components: preexperience, experience, reflection, and integration. Schön^{10,11} recognized the substantial contribution of critical reflection in the development of professional knowledge and clinical expertise and identified 3 stages of reflection: conscious reflection, criticism, and action. Boud et al¹² presented a 4-stage model of reflection: analyze, interpret information, prepare an evaluation report, and prepare an action plan. Moon^{13,14} approached reflection as a form of mental processing and described 5 stages of learning (noticing, making sense, making meaning, working with meaning, and transformative learning), which move from surface learning to deep learning. Moon^{13,14} argued that reflection occurs in the transformative learning stage, facilitating deeper learning. The commonalities of these models⁹⁻¹⁴ seem to indicate that reflection is executed either in a hierarchy of stages and levels or in a linear way.

The model examined in the present study may be interpreted as having both a vertical and iterative loop structure (*Figure*). The vertical nature was evident when data analysis detected multiple levels of reflection types. Some discussions started at a superficial level and then

moved to deeper levels that incorporated critical analysis and synthesis. The reflection process itself characterized the iterative dimension, which was activated through problem solving (ie, case-based scenarios) or experience toward gaining new insights.

The current model has multilayered reflection phases. Students may begin with 1 type of reflection and then lead to another. Thus, each type revisits or reveals new meanings or creates a new concept or way of thinking. The variability in reflection types and students' reflection processes mirror Mezirow's notion of transformative learning.^{15,16} The ultimate goal of the current reflection model is the transformation of the gained knowledge, skills, and behaviors into action in the medical practice setting.

Implementing reflective practices to discussion-based collaborative learning in training medical students seems to provide substantial pedagogical value. Using an online curriculum that emphasizes collaborative learning techniques has great potential to develop students' higher-level thinking and reflective skills as well as to develop responsibility for each other's learning. Case-based discussion board activities were further found to:

- promote critical thinking skills, thereby allowing metacognition and reflection to occur, which produces knowledge development in its various forms
- involve students actively in the learning process
- model appropriate problem-solving techniques and reveal students' decision reasoning
- promote diverse viewpoints, thus building diversity of understanding among students
- provide the foundation for developing learning communities
- allow learners to critique and assess their own or peers' learning (reflection tool)

With no identifiable change in the nature of student responses as they progressed from 1 case challenge to the next, the impact of this tool in creating a reflective

mindset among students remains unclear. We need to understand how a reflection tool can be used by students and how evidence of reflection during this type of online education can be captured. It seems that the tool created for the present study enhanced students' metacognitive processes through their self-disclosure statements and offered a framework to interpret how group collaboration created content knowledge, how group members offered deeper insights about the content, and how students regulated their own cognition and group learning skills. Goos et al¹⁷ described 2 types of self-oriented statements: (1) self-disclosure statements, which clarify, elaborate, evaluate, and justify one's own thinking, and (2) feedback requests, which invite a peer to critique one's own thinking.

Learning community building was very strong in the present study as evidenced by consistency in the use of dialogic reflection. Case-based group discussion activities seemed to increase group interaction, with higher critical thinking skills, intragroup support to each other's learning, group synergy, student engagement, and collective efforts to complete assignments. An effective learning community is that in which all students collaborate to exchange ideas, extract relevant questions from the cases, and reflect on multidimensional case analysis for meaningful learning.^{18,19} Further, effective learning occurs through social interaction and negotiation.²⁰ The case-based project assignments were an effective way to form a foundation for both individualized reflection as well as collaborative learning. By its nature, therefore, collaborative learning promotes skills in communication and professionalism, which are core competencies of osteopathic medicine.

The present study did have some inherent limitations. One limitation was that the data are heavily qualitative, with limited quantitative data for further triangulation. The available quantitative data are provided to demonstrate the overall consistency of participation by the students in all aspects of the online module. The use of 2 coders and 2 methods of qualitative data analysis (manual coding and automated coding) was an effort to minimize bias in interpreting and categorizing student

comments. Whereas the final sample size was small (N=17), we drew compelling insight into the reflective activities of the students. Demographic breakdown was not considered in the final analysis of responses. Last, the temporal relationship of student comments and those of faculty facilitators was treated as irrelevant in developing the conclusions drawn.

Conclusion

Reflection is a metacognitive process that reveals our thinking skills and increases self-awareness in learning. In medical practice, reflection is imperative in making accurate judgments and carefully examining experience and knowledge. The development of reflective skills can be encouraged by integrating the deliberate practice of discussion and group-based educational activities into medical education curriculum. The present study provides evidence that we have opportunities to foster high levels of reflection and deep learning in our teaching using a technology-enhanced instructional delivery method. Online instruction as an innovative best practice is conducive to a dynamic and collaborative learning environment that benefits both the instructors and the students.

Author Contributions

Drs Lewis, Farber, Chen, and Peska provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; Drs Lewis and Peska drafted the article or revised it critically for important intellectual content; Drs Lewis and Peska gave final approval of the version of the article to be published; and Drs Lewis and Peska agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References

- Dewey J. *Experience and Education*. 33rd ed. New York, NY: Macmillan; 1938.
- Dewey J. *How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process*. 2nd ed. New York, NY: D.C. Heath & Company; 1933.
- Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: a systematic review [published online November 23, 2007]. *Adv Health Sci Educ Theory Pract*. 2009;14(4):595-621.
- Carraccio CL, Englander R. From Flexner to competencies: reflections on a decade and the journey ahead. *Acad Med*. 2013;88(8):1067-1073. doi:10.1097/ACM.0b013e318299396f.
- Ertmer PA, Newby TJ. The expert learner: strategic, self-regulated, and reflective. *Instruct Sci*. 1996;24(1):1-24.
- Glaser BG, Strauss AL. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Piscataway, NJ: Aldine Transaction; 1999.
- Strauss A. *Qualitative Analysis for Social Scientists*. Cambridge, UK: Cambridge University Press; 1987.
- Corbin J, Strauss A. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 3rd ed. Thousand Oaks, CA: Sage Publications, Inc; 2007.
- Hutchinson CJ, Allen KW. The reflection integration model: a process for facilitating reflective learning. *Teacher Educator*. 1997;32(4):226-234. doi:10.1080/08878739709555149.
- Schön DA. *The Reflective Practitioner*. 2nd ed. San Francisco, CA: Jossey-Bass; 1991.
- Schön DA. *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in Professions*. San Francisco, CA: Jossey-Bass; 1996.
- Boud D, Keogh R, Walker D, eds. *Reflection: Turning Experience Into Learning*. London, UK: Routledge; 1985.
- Moon JA. *Reflection in Learning and Professional Development: Theory and Practice*. London, UK: Routledge; 1999.
- Moon JA. *A Handbook of Reflective and Experiential Learning: Theory and Practice*. London, UK: Routledge; 2004.
- Mezirow J, Associates. *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Learning*. San Francisco, CA: Jossey-Bass; 1990.
- Mezirow J. *Transformative Dimensions of Adult Learning*. San Francisco, CA: Jossey-Bass; 1991.
- Goos M, Galbraith P, Renshaw P. Socially mediated metacognition: creating collaborative zones of proximal development in small group problem solving. *Educ Stud Mathem*. 2002;49(2):193-223.
- Palloff RM, Pratt K. *Building Online Learning Communities: Effective Strategies for the Virtual Classroom*. San Francisco, CA: Jossey-Bass; 2007.
- Vora Rs, Kinney MN. Connectedness, sense of community, and academic satisfaction in a novel community campus medical education model. *Acad Med*. 2014;89(1):182-187. doi:10.1097/ACM.0000000000000072.
- Shapiro A. The latest dope on research (about constructivism): part I: different approaches to constructivism—what it's all about. *Int J Educ Reform*. 2002;11(4):347-361.

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