

Supporting students in self-regulation: Use of formative feedback and portfolios in a problem-based learning setting

ELAINE F. DANNEFER & RICHARD A. PRAYSON

Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, USA

Abstract

Background: The widely recognized need for students to self-regulate their behavior and learning extends to the multiple dimensions of professionalism.

Aim: This study examines the extent to which students self-regulate professionalism behaviors related to work habits and interpersonal skills in a PBL setting.

Methods: Formative feedback on work habits and interpersonal skills provided by peers and tutors to a Year 1 cohort ($n = 32$) over the course of a year-long PBL experience (5 blocks) was examined for comments on targeted areas for improvement (TAFIs) and observed improvements. We examined congruence between PBL feedback and students' self-reported TAFIs and behavioral improvements in their assessment portfolios.

Results: Both PBL peer and faculty feedback and portfolio self-assessments targeted Interpersonal Skills TAFIs more frequently than Work Habit-related issues. TAFIs were more frequently identified midway in PBL blocks versus the end. Students reported TAFIs in their portfolio essays, citing feedback from both peers and tutors, and provided evidence of improved performance over time.

Conclusions: Students utilized external formative feedback to document their portfolio self-assessment in a system designed to support self-regulation of PBL professionalism-related behaviors. A decrease in TAFIs identified at the end of PBL blocks suggests students made use of mid-block feedback to self-regulate behaviors.

Introduction

Society expects physicians to self-regulate performance by managing their ongoing professional development with regard to competencies needed in practice. Self-regulation (SR), recognized as a complex and multifaceted process, entails monitoring, self-assessing, and modulating performance for purposes of improving performance (Zimmerman & Schunk 2011). How to train medical students in SR in preparation for becoming independent practitioners presents a challenge to medical education. Programs need to be designed to support all students in developing their ability to monitor and self assess performance, and to regulate by setting goals and implementing learning plans (Cleary & Zimmerman 2004; Brydges & Butler 2012).

In 2004, Cleveland Clinic Lerner College of Medicine (CCLCM) implemented a program designed specifically to promote the development of self-regulated learners (Dannefer & Henson 2007). The program incorporates multiple features recognized as important supports for SR actions. Problem-based learning (PBL) and seminars demand active engagement and self-directed learning strategies (White 2007; Murad et al. 2010). A competency-based assessment approach provides explicit performance standards and ongoing, information-rich formative assessments (Nicol & McFarlane-Dick 2006;

Practice points

- Educational programs need to support the development of self-regulation skills
- Explicit standards of behavior, formative feedback, and longitudinal experiences provide support for continuous improvement
- Narrative formative feedback from peers and tutors offer similar as well as differing perspectives useful for self-assessment

Holmboe 2010). Electronic access to assessments gives students and their advisors immediate feedback necessary for monitoring performance across competencies. Portfolio-related processes require students, with the support of their advisors, to reflect on feedback and engage in structured self-assessment and goal setting activities (Eva & Regehr 2005; Driessen et al. 2008). Rather than depending on one particular feature to promote SR, all learning, assessment, and advising activities interconnect to support the development of self-regulated learning habits.

We confront the question of whether or not students use CCLCM's learning environment to self-regulate performance by focusing on the core competency of professionalism.

Correspondence: Elaine F. Dannefer, Cleveland Clinic Lerner College of Medicine, 9500 Euclid Avenue NA 24, Cleveland, OH, USA. Tel: 216-445-1058; fax: 216-445-7442; email: dannefe@ccf.org

Professionalism remains a challenge for medical education where interventions have focused primarily on curriculum (Cruess & Cruess 2006; Bryden et al. 2010), role modeling (Kenny et al. 2003; Quaintance et al. 2010), and assessment (Stern 2006; van Mook et al. 2007). These approaches, however, are not designed specifically to help students develop skills to self-regulate professionalism.

We selected for this study of SR the content of PBL feedback on professionalism and its use by students to identify learning needs (self-assess) and document improvement (regulate). We asked these questions:

- (1) To what extent did the content of peer and tutor PBL narrative feedback provide information relevant to the professionalism competency standards?
- (2) To what extent did students self-report and document professionalism learning needs and improvements consistent with peer and tutor PBL feedback in a portfolio used for promotion decisions?

Study design and methods

Study design

This study presents an analysis of (1) narrative feedback on professionalism provided to Year 1 medical students from PBL peers, tutors, and self and (2) summative portfolio essays to determine how students used PBL feedback to support their self-assessments. We limited the study to year one the time period reported by students, and supported by advisors' observations, as requiring significant adjustments in terms of taking responsibility for their own learning.

Educational context

Students meet in PBL groups to engage in case-based/problem-solving discussions in three, two-hour sessions each week throughout the first year of medical school. Groups of eight students meet with a different tutor each of five, seven-to-nine week PBL blocks. Both students and tutors are trained in writing observation-based, narrative feedback targeting areas needing improvement as well as strengths. The observations are directly entered into an electronic assessment database. Collecting mid- and end-of-block feedback provides students the opportunity to show evidence of improvement.

Each student is assigned a physician advisor, who partners with them across the curriculum to facilitate the development of SR skills. Access to the electronic assessment database comprised of formative feedback and academic work allows students and their advisor to monitor performance and to engage in a reflective dialogue about the student's performance and self-assessments.

Periodically, students engage in required, structured reviews of their performance with their advisor. They submit to their advisor a portfolio of essays in which they self-assess their progress in meeting the competency standards documented with self-selected evidence from their assessment database. At the end of the year, students construct a summative portfolio, composed of essays self-assessing their

progress in meeting the school's nine competencies and documented with self-selected evidence, which is submitted for review to a promotion committee.

Measures

Faculty defined measurable, behavioral competency standards developmentally appropriate for Year 1 students and observable across multiple settings. Two professionalism standards can be observed in the PBL setting: (1) "Behaves in a respectful, professional, and reliable manner", hereafter referred to as *Interpersonal Skills*, and (2) "Assumes responsibility for own learning and actively contributes to the learning of peers", hereafter referred to as *Work Habits* (Dannefer et al. 2005). Self-regulation, as a process, consists of overlapping and recursive activities of which we targeted self-assessments that identified areas needing improvement and cited evidence that documented improved performance.

Data sources

We collected peer and tutor PBL assessments electronically at mid and end of Block 1 problem-solving sessions, and from peers, tutors and self at mid and end of Blocks 2-4 and end of Block 5 case-based sessions. The PBL assessment form (Appendix) requests narrative feedback on "targeted areas for improvement" and "areas of strength" for the professionalism standards of *Interpersonal Skills* and *Work Habits*; criteria listed on the form for each standard focus attention on observable behaviors and provide guidance on what should be assessed.

For the Summative Portfolio, students write two-page essays for each of the school's nine competencies. Students cite formative assessments, collected throughout the year, using a bibliographic software application to link specific evidence to judgments they make about their performance in the essays. Because professionalism cannot be compartmentalized, students address standards not only in the Professionalism Competency essay but also in the Communication, Personal Development, and Reflective Practice competency essays. Thus, data used in this study included essays and citations for these four competencies.

Coding and analysis of PBL narrative feedback. A trained research assistant extracted the electronic competency report of all PBL feedback for professionalism for all first-year students ($n=32$) for the 2009 academic year, and replaced students' names with a unique six-digit identifier. We developed a rubric using the PBL assessment form criteria for *Interpersonal Skills* and *Work Habits* to individually code five competency reports. The authors then met and reached consensus on coded professionalism statements about TAFIs and observed improvements. The refined *Professionalism Rubric* has three unprofessional behavior criteria each for *Interpersonal Skills* (Dominating, Quiet, Inappropriate) and for *Work Habits* (Late, Ill-prepared, Distracted). Each author coded the remaining reports before meeting to reach consensus and in rare instances of coding differences; these discrepancies were reconciled. The authors tallied type and

number of professionalism statements for each student for each block from peers, tutors and self.

Coding and analysis of summative portfolio essays. A research assistant extracted the summative portfolio essays from the database for the four competencies (Professionalism, Communication, Personal Development, and Reflective Practice) that 32 students submitted at the end of the 2009 academic year, for a total of 124 essays.

The authors used the *Professionalism Rubric* to analyze the portfolio essays for the aforementioned competencies, where professionalism issues were likely to be addressed. The authors independently coded professionalism statements before meeting to reach consensus in the rare instances where there were differences in coding. All PBL citations used to document the coded statements were tallied by source (tutor, peer, self) and block time period.

Results

- (1) To what extent did the content of peer and tutor PBL narrative feedback provide information relevant to the professionalism competency standards?

Table 1 summarizes the content of aggregate PBL tutor and peer feedback as well as PBL self and portfolio self-assessments. Of all TAFIs identified by tutors, *Interpersonal Skills* account for 63%. *Interpersonal Skills* also dominated peer statements (57%). The majority of tutor and peer TAFI statements about *Interpersonal Skills* indicated a concern with “quietness” (e.g. lack of participation). In the area of *Work Habits*, peers more frequently identified “preparedness” (e.g. disorganized presentations) as a TAFI in fellow students as compared with tutors, who more frequently documented behaviors associated with being “distracted” (e.g. carrying on side conversations). Peers were also more likely to give feedback on TAFIs than tutors; of 2016 peer assessments, 41% contained feedback on TAFIs. Overall, tutor feedback tended to be less detailed and only 28% of the 288 possible assessments contained feedback on TAFIs.

Similar to tutor and peer evaluations, students self-identified *Interpersonal Skills* issues as TAFIs more often than *Work Habit*-related issues (60% vs. 40% respectively). Also similar to peer assessments, students frequently self-

identified “ill-preparedness” as the *Work Habit* most needing improvement. In contrast to peer and tutor feedback, however, students more frequently self-identified “dominating” behavior issues rather than “quietness”. All students, except for one who did not complete self-assessments, self-identified TAFIs also reported by their peers and tutors. Interestingly, 95% of students at some point during the year also self-identified issues not documented by peers and tutors. Table 1 shows that peer and tutor feedback and self-assessments documented improvements less frequently than TAFIs, and statements noting improvement in *Interpersonal Skills* were more frequent than statements of improvement in *Work Habits*.

Figure 1 documents peer and tutor feedback statements for students at mid and end of the four PBL blocks. In aggregate, more TAFI statements were made by peers and tutors for mid-block assessments than at the end of the block with an overall decrease across the year. Regarding individual student data, 29 of the 32 students had more TAFIs documented at mid-block by peers as compared with end-of-block, and early in the year

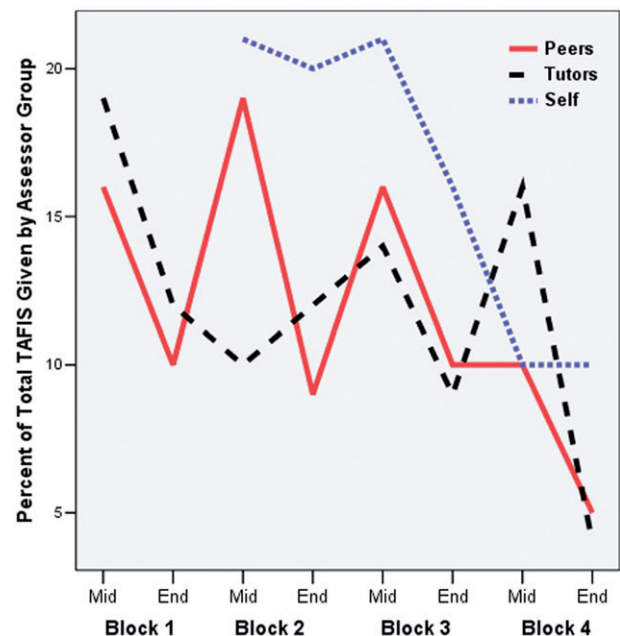


Figure 1. Percent of total TAFI statements from tutors (99), peers (744), and self (159) at mid and end of four PBL blocks.

Table 1. Topics of PBL tutor and peer feedback and self-assessments and of feedback cited in portfolios.

Types of Feedback Statements	Targeted areas for improvement statements				Statements noting improvement			
	Tutor (%)	Peers (%)	Self (%)	Portfolio (%)	Tutor (%)	Peers (%)	Self (%)	Portfolio (%)
<i>Work habits statements</i>	37	43	40	46	26	36	29	33
Punctuality	12	6	2	5	7	3	2	3
Ill-prepared	7	24	30	30	7	23	21	20
Distracted	18	12	11	11	11	10	6	10
<i>Interpersonal skills statements</i>	63	57	60	54	74	64	71	67
Dominating	14	15	16	16	30	16	35	23
Quiet	48	42	35	35	44	47	37	43
Inappropriate	1	1	3	3	0	1	0	0
Total number statements	N = 113	N = 823	N = 169	N = 37	N = 27	N = 377	N = 52	N = 30

(Blocks 1–2) versus later in the year (Blocks 3–4). Similarly, more evidence with regard to improvements was documented for students by peers in end-of-block and late year feedback versus mid block and early year feedback, respectively. Similar trends were noted in the tutor feedback for mid- and end-of-block TAFIs and improvement statements.

- (2) To what extent did students self-report and document professionalism learning needs and improvements consistent with peer and tutor PBL feedback in a portfolio used for promotion decisions?

Student self-assessments presented in their summative portfolio essays are required to be a representative and balanced account of their professional behavior across the year. As an indicator of “representative”, we identified behaviors that were observed by tutors in at least two different groups, which suggest stability of behavior across time and group dynamics. For the 16 students where two different tutors identified the same TAFI, peers identified the same TAFIs as the tutors in five PBL Blocks for seven students, four PBL blocks for six students, three PBL blocks for two students, two

PBL blocks for one student. All 16 students reported the TAFI in their summative portfolio, citing both tutor and peer feedback. All cited evidence of improvement from peers and/or tutors.

A strong majority (91%) of portfolio essays followed a pattern of citing feedback from PBL peers and/or faculty to identify at least one TAFI, followed by citations indicating improved performance. To illustrate student’s use of PBL feedback to document performance, we provide the portfolio self-assessment of one student who received ten TAFIs during the first half of the year and three in the second half, indicating a tendency to dominate. The tendency to dominate was mentioned by peers in four of the five PBL groups but never mentioned by tutors. These comments included statements such as “talking over people,” “can push ideas a little bit too hard “sometime can seem argumentative/defensive” and needs to “listen to other viewpoints even though they might not coincide with personal views.” Three other TAFIs were mentioned three or less times and only in the first half of the year. Table 2 provides quotes from this one student’s cited PBL feedback, documenting a TAFI (tendency to dominate) and

Table 2. PBL citations for student example of portfolio professionalism competency essay.

Targeted Areas for Improvement	Strengths
(1) Peer Mid Block 1. Something that may be helpful is to really take time to listen to what your other group members are saying. You have such a wealth of knowledge and are anxious to share it, and while this is an extremely positive trait; your enthusiasm can sometimes mask the contributions of your peers. As a suggestion, wait for a second or two of silence between comments so that everyone who wants to has a chance to contribute.	You cooperate well in a group setting and I really appreciate your ability to effectively communicate your thoughts and suggestions in helping to improve our group dynamic. You seem very receptive to feedback and I’m glad you are comfortable enough to share your feelings with us Your presentations are thoughtful and thorough and really help me to better understand the material on a different level. . . . You have a natural curiosity and ask great questions that often stimulate thoughtful but relevant group discussion.
(2) Peer End Block 3. . . . as you had a great deal to contribute, it was difficult sometimes for others to contribute and answer a question. It might be helpful in the future to allow other students to contemplate a question and allow it to be answered in an LO, and be aware that certain areas expertise might not be completely understood by the group.	You are highly attentive to the group and have been one of the most vocal participants in the endocrine block. You are a careful listener and were able to correct inaccuracies that were stated. You are willing to act on feedback from the group, and regularly provide feedback to faculty and other group members. You were quite helpful in finessing how we were working as a group in the new style of LO discussion.
(3) Peer Mid Block 3. I appreciate (and share) your excitement for the material, but at times your excitement will cause you to talk over or dominate a conversation. This is a major problem that I constantly struggle with. One piece of advice that my PA offered me was the following: When I think of something that I want to share with the group, I try to write it down on paper before I speak. This allows the group a chance to talk before I enter the conversation.	You are always very respectful of your peers, and you have a great desire to teach us from your great breadth of knowledge. Your desire to learn and teach your peers shows your dedication to us and to this program. Also, you have been very flexible as we transitioned to a new style of PBL. This has really helped the group to develop into something great.
(4) Block 2 End. Because you are such a respected presence in our group, I think you may be able to assume a bit more of a leader role . . . to move the group forward You are an extremely good listener who possesses the ability to logically interpret and synthesize the groups’ ideas
(5) Tutor End Block 1. Strive to engage other members of the group that are not participating as much as they could	Respects peers’ ideas and questions; listens attentively. Accepts and acts on feedback from group. Gives useful feedback to faculty facilitator and other group members
(6) Peer End Block 3	. . . You are very respectful of the thoughts, questions, and concerns of the rest of the group members. You have also followed your own suggestion to be a more attentive listener throughout this half of the block
(7) Peer End Block 2	. . . You have acted on previous feedback about holding back at times, and presenting your thoughts at crucial points. This has made you more effective in making an impact during a discussion, and has improved your group process skills.
(8) Peer End Block 2	. . . You have wonderful, respectful way of talking to the group that gets your point across without being pushy, confusing, or aggressive.

Table 3. Summative portfolio essay.

Although active participation and facilitation of the group is consistently cited as one area of strength, I am aware that I will have to continue to control my enthusiasm in certain areas to allow others to contribute to the conversation (1, 2, 3). One peer suggested I funnel energy into assuming “a bit more of a leader role at times” to help facilitate the group process (4). It was also noted that posing more questions and fewer comments might help “engage other members of the group that are not participating as much as they could”(5). Since amending my participation style, I have received more affirmative feedback from PBL peers (6). Nevertheless, I will continue to strive for a balance of listening, sharing, and facilitating the group. Lastly, after reflection of all the feedback from PBL peers and tutors, I have been working on finding the balance between listening, sharing, and facilitating the group. Over the year I found that “holding back at times” and sharing “thoughts at crucial points” has made me “more effective in making an impact during a discussion”(7). In particular, I have found a “wonderful, respectful way of talking to the group that gets [the] point across without being pushy, confusing, or aggressive”(8). However, I recognize that this is a balance I will have to reestablish with each new PBL group.

evidence of improvement over the course of year 1. This student acknowledged and reflected on this TAFI in the portfolio essay and provided evidence of improvement, noting that this behavior may need to be “reestablished” with each new working group. See Table 3 for excerpt from this student’s portfolio.

The essay provides evidence relevant to each of our questions. The student identified and acknowledged a problematic pattern of behavior, reflected on the feedback, and used suggestions to “amend” behavior, which resulted in improved performance. Not every student described the self-regulation process in such detail, but all acknowledged a behavior identified by peers and/or tutors that was problematic and presented evidence of improvement.

Discussion

This study examines the effects of a program designed to train students in SR by focusing on the core competency of professionalism. PBL peer and tutor feedback provided students with feedback on two professionalism standards related to work habits and interpersonal skills. Evidence that students use this feedback to inform SR actions includes these findings: (1) student self-assessments are in line with peer and tutor assessments, (2) fewer TAFIs were given in mid versus end block assessments and in early versus later year assessments; and (3) students acknowledge and address TAFIs identified by peer and tutors, and provide evidence of improvement in their end of year summative portfolios.

The PBL proved a useful venue for examining student SR actions longitudinally by providing information-rich feedback, the opportunity make changes, and support for self-directed learning (Evensen et al. 2001; White 2007). Even the act of giving feedback correlates with improved performance in professionalism (Schonrock, et al. 2007). The longitudinal nature of the feedback ensures that patterns of behavior emerge and become explicit. As illustrated in the example provided, narrative feedback based on observed behavior is difficult to ignore or dismiss, unlike rating scales, where behaviors are abstract and decontextualized. Problem professionalism behaviors can

reoccur with each new PBL block or group, as exemplified in the portfolio essay case example in which the student acknowledges the need to “reestablish” appropriate interaction with peers in each new group.

The PBL feedback in this study was consistently specific and related to the professionalism behaviors identified by faculty as fundamental to practice. Of note, peers often made suggestions for how to improve performance, a type of feedback more likely to result in changes in behavior (Clark 2012). This study suggests that peers contribute useful feedback valued and cited by students as evidence of a TAFI or improvement, and provide information different from tutor feedback (Dannefer et al. 2005). Rather than viewing this difference as problematic, multiple perspectives may serve to encourage reflection and reinforce the importance of soliciting feedback from multiple sources.

The sample consisted of one class with one year’s experiences in one school, thus limiting the generalizability of the findings. Parsing out the impact of each component of the program is difficult and study results should be viewed as the outcome of a total learning environment designed to promote a culture of continual improvement. Although not addressed, the student-advisor interaction undoubtedly played a critical role in helping student reconcile their internally generated feedback with the formative feedback from peers and faculty (Driessen et al. 2005; Dekker et al. 2009). Evidence of improved performance could, of course, be related to students colluding to provide each other evidence needed to demonstrate that they are meeting professionalism standards, although our evaluation studies (Dannefer et al. 2012) and student perspectives suggest otherwise (Altahawi et al 2012).

While this study suggests that students are using the supports of this educational program to self-regulate, we need to better understand how students process and use feedback, how external feedback triggers and shapes internally generated feedback, what role advisors play in helping students reflect on and use feedback, and what processes students use to make judgments and develop plans for improvement, questions being addressed by the work of Sargeant et al. (2008, 2009, 2011). As future physicians, today’s students will need to be able to self-regulate their behaviors in settings where feedback may not be as structured or robust and facilitation of reflection lacking. To support development of SR skills, we need medical school programs designed to provide formative feedback and clear standards, opportunities to improve, and facilitated self-assessment. The PBL-portfolio model provides one strategy by which students can gain skills in self-regulation and develop habits useful for future practice.

Acknowledgements

The authors would like to express thanks to Drs Beth Bierer and Dale Dannefer for reviewing this manuscript and to Ann Honroth for her help in extracting data for this study.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Notes on Contributors

DR ELAINE F. DANNEFER is a Professor of medicine and Director of Research and Assessment at the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, Cleveland, OH, USA.

DR RICHARD PRAYSON is a Professor of Pathology and Director Of Student Affairs at the Cleveland Clinic Lerner college of Medicine of Case Western Reserve, Cleveland, OH, USA.

References

Altahawi F, Sisk B, Poloskey S, Hicks C, Dannefer EF. 2012. Student perspectives on assessment: Experience in a competency-based portfolio system. *Med Teach* 34(3):221–225.

Bryden P, Ginsburg S, Kurabi B, Ahmed N. 2010. Professing professionalism: Are we our own worst enemy? Faculty members' experiences of teaching and evaluating professionalism in medical education at one school. *Acad Med* 85(1):1025–1034.

Brydges R, Butler D. 2012. A reflective analysis of medical education research on self-regulation in learning and practice. *Med Educ* 46(1):71–79.

Clark I. 2012. Formative assessment: Assessment is for self-regulated learning. *Educ Psychol Rev* 24(2):205–249.

Cleary TJ, Zimmerman BJ. 2004. Self-regulation empowerment program: A school-based program to enhance self-regulated and self-motivated cycles of student learning. *Psychol Schools* 41(5):537–550.

Cruess RL, Cruess SR. 2006. Teaching professionalism: General principles. *Med Teach* 28(3):205–208.

Dannefer EF, Bierer SB, Gladding SP. 2012. Evidence within a portfolio-based assessment program: What do medical students select to document their performance? *Med Teach* 34(3):215–220.

Dannefer EF, Henson LC. 2007. The portfolio approach to competency-based assessment at the Cleveland Clinic Lerner College of Medicine. *Acad Med* 82(5):493–502.

Dannefer EF, Henson LC, Bierer BS, Grady-Weliky TA, Meldrum S, Nofzinger AC, Barclay C, Epstein RM. 2005. Peer assessment of professional competence. *Med Educ* 39(7):713–722.

Dekker H, Driessen E, Ter Braak E, Scheele F, Slaets J, van der Molen T, Cohen-Schotanus J. 2009. Mentoring portfolio use in undergraduate and postgraduate medical education. *Med Teach* 31:903–909.

Driessen E, van Tartwijk J, Dorman T. 2008. The self critical doctor: Helping students become more reflective. *BMJ* 336(10):827–830.

Driessen EW, van Tartwijk J, Overeem K, Vermunt JD, van der Vleuten CPM. 2005. Conditions for successful reflective use of portfolios in undergraduate medical education. *Med Educ* 39(12):1230–1234.

Eva KW, Regehr G. 2005. Self-assessment in the health professions: A reformulation and research agenda. *Acad Med* 80(10 Suppl):S46–S54.

Evensen DH, Salisbury-Glennon JD, Glenn J. 2001. A qualitative study of six medical students in a problem-based curriculum: Toward a situated model of self-regulation. *J Ed Psych* 9(4):659–676.

Holmboe ES, Sherbino J, Long DM, Swing SR, Frank JR. 2010. The role of assessment in competency-based medical education. *Med Teach* 32(8):676–682.

Kenny NP, Mann KV, MacLeod H. 2003. Role modeling in physicians' professional formation: Reconsidering an essential but untapped educational strategy. *Acad Med* 78(12):1203–1210.

Murad MH, Coto-Yglesias F, Varkey P, Prokop LJ, Murad AL. 2010. The effectiveness of self-directed learning in health professions education: A systematic review. *Med Educ* 44(11):1057.

Nicol DJ, Macfarlane-Dick D. 2006. Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Stud High Educ* 31(2):199–218.

Quaintance JL, Arnold L, Thompson GS. 2010. What students learn about professionalism from faculty stories: An "appreciative inquiry" approach. *Acad Med* 85(1):118–123.

Sargeant JM, Mann KV, van der Vleuten CP, Metsemakers JF. 2008. "Directed" self-assessment: Practice and feedback within a social context. *J Cont Ed Health Prof* 28(1):47–54.

Sargeant JM, Mann KV, van der Vleuten CP, Metsemakers JF. 2009. Reflection: A link between receiving and using assessment feedback. *Adv Health Sci Educ* 14(3):399–410.

Sargeant J, McNaughton E, Mercer S, Murphy D, Sullivan P, Bruce D. 2011. Providing feedback: Exploring a model (emotion, content, outcomes) for facilitating multisource feedback. *Med Teach* 33(9):744–749.

Schonrock J, Heighe-Penninga M, van Duijn MA, Geertsma J, Cohen-Schotanus J. 2007. Assessment of professional behavior in undergraduate medical education: Peer assessment enhances performance. *Med Educ* 41(9):836–842.

Stern DT (Ed). 2006. *Measuring medical professionalism*. Oxford, UK: Oxford University Press.

White CP. 2007. Smoothing out transitions: How pedagogy influences medical students' achievement of self-regulated learning goals. *Adv Health Sci Educ* 12(3):279–297.

Van Mook W, deGrave WS, Huijssen-Huisman E, De Witt-Luth M, Dolmans D, Muijtjens A, Schuwirth LW, van der Vleuten C. 2007. Factors inhibiting assessment of students' professional behavior in the tutorial group during problem-based learning. *Med Educ* 41(9):849–856.

Zimmerman BJ, Schunk DH. 2011. Self-regulated learning and performance. In: Zimmerman DH, Zimmerman BJ, editors. *Handbook of self-regulation of learning and performance*. New York: Routledge. pp 1–14.

Appendix

Table A1. PBL assessment form completed by peers, tutors, and as a self-assessment.

Please write comments for each component of the professionalism competency, providing specific examples where possible.

Behaviors	Targeted areas for improvement	Strengths
Interpersonal Skills <ul style="list-style-type: none">Respects peers' ideas and questions; listens attentivelyAccepts and acts on feedback from groupGives useful feedback to faculty facilitator and other group members		
Work Habits <ul style="list-style-type: none">Comes prepared for the weekFacilitates group processAttends sessions/is punctual		
Global Comments:		