Struggling to Be Self-Directed: Residents' Paradoxical Beliefs About Learning

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Abstract

Purpose

Self-directed learning (SDL) skills serve as the basis for physician lifelong learning; however, residency training does not typically emphasize SDL skills. To understand residents' needs regarding SDL curricula, the authors used qualitative methods to examine the residency learning culture and residents' views of SDL.

Method

The authors conducted individual, in-depth, semistructured interviews with all 13 final-year residents at the Brown University Family Medicine Residency Program. Interviews were audio taped and transcribed verbatim. Using an

iterative individual and group process, four researchers conducted a qualitative analysis of the transcripts, identifying major themes and higher-order interpretations.

Results

Major themes included resident beliefs about learning, the learning culture in residency, and developmental progress in learning. Four paradoxes emerged in the analysis: (1) Residents understand and value the concept of SDL, but they engage in limited goal setting and reflection and report lack of skills to manage their own learning, particularly in the clinical setting. (2) Despite being immersed in what aims to be a learner-

centered culture, many residents still value traditional, teacher-centered approaches. (3) Residents recognize patient care as the most powerful stimulus for SDL, but they often perceive patient care and learning as competing priorities. (4) Residents desire external guidance for SDL.

Conclusions

Graduating residents lacked confidence in their SDL skills and their ability to manage their learning, especially in clinical settings. Fostering SDL skills during residency will likely require training and guidance for SDL as well as changes in the structure and culture of residency.

The current culture of U.S. residency education derives from a traditional apprenticeship model that has functioned adequately for many generations. In this model, expert teachers transmit knowledge to learners with similar educational backgrounds. Learners gain expertise through providing care to numerous patients during long hours on duty while receiving gradually diminishing supervision.

For several reasons, this model may not best serve the needs of today's trainees. Physicians face an ever-expanding volume of new medical knowledge which they must access, appraise, synthesize, and apply to practical, high-quality care for patients, families, and communities. The content and process of patient care change rapidly, rendering adaptation to change a necessary skill for successful practice. These factors may be most pronounced in primary care, which demands a huge breadth of knowledge and skills to provide care for people of all ages and treat a wide spectrum of disease. In addition to the diversity of knowledge and skills required of today's primary care trainees, diversity among primary care residents continues to grow. Since 2004, graduates of medical schools outside the United States made up 38% to 42% of U.S. family medicine residents,[1] increasing heterogeneity among learners and perhaps rendering a "one size fits all" curriculum less effective. Finally, restrictions on resident work hours may limit volume and diversity of clinical experience during training, potentially limiting educational experiences for trainees in the traditional residency model.

Although not traditionally emphasized in residency education, self-directed learning (SDL) skills not only have the potential to address these challenges and improve learning during medical training but also may prove crucial to optimizing future physician performance in the context of a rapidly changing practice environment.[2,3] The prevailing model of SDL outlines the following steps through which learners actively manage their own learning: (1) diagnose learning needs, (2) formulate learning goals, (3) identify resources for learning, (4) select and implement learning strategies, and (5) evaluate learning outcomes.[4] A review of research on SDL in the context of health professions education reinforced the aforementioned elements and emphasized the educator's role as facilitator of this process of reflection on learning.[5] By assisting individual residents to focus their learning efforts to meet their specific learning needs, SDL training could improve the efficiency of learning in the context of a standard residency curriculum. In addition, residents who develop skills to manage their own learning in the clinical environment should be more effective learners for the remainder of their careers.

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Recognizing the potential for SDL to enhance learning in residency and beyond, the Accreditation Council for Graduate Medical Education (ACGME) requires residents to develop SDL skills.[6] However, a major challenge to implementing meaningful curricula on SDL is the prevailing culture of medical education, which has been described as "dominated by unreflective doing."[7] Fatigue from long work hours in residency adds additional barriers to reflection on learning experiences.

A practical understanding of residents' views about SDL and the culture of learning in residency should inform interventions to develop residents' SDL skills. Few studies have explored residents' perspectives on learning culture or SDL. As part of a larger study aiming to foster SDL in family medicine residency, we conducted a qualitative study to examine the prevailing culture of learning in residency, residents' approaches to learning, and their views on SDL.

Method

The authors are a multidisciplinary group of primary care educators and researchers with different theoretical groundings and distinct methodological perspectives. We are two U.S.-based family physicians who have a strong commitment to residency education (G.A. and M.N.), an Israel-based family physician and medical educator (S.R.), and a U.S.-based medical anthropologist (R.E.G.). Throughout the project, we openly discussed the biases that our backgrounds and experiences may engender in each of us and considered potential effects on our interpretation and presentation of data.

We conducted this study at the Brown University Family Medicine Residency Program, a three-year program based in a community hospital in Pawtucket, Rhode Island. Before implementing the SDL intervention, the principal investigator (M.N.) invited all family medicine residents to participate in the evaluation process. The human subjects committee of Memorial Hospital of Rhode Island approved the study, and participants provided written informed consent. To protect participants' anonymity, we have intentionally omitted the year of the data collection from this report.

Interview process

The medical anthropologist member of the research team (R.E.G.) conducted an in-depth, semistructured, individual interview with each of the 13 residents who were in their final year of training during the study period. The interviewer was familiar to these residents in her role teaching research skills, and she did not have an evaluative role in the residency. These residents had not received any formal SDL training and, therefore, provided preintervention perspectives on SDL and the culture of learning in the residency. The interviewer asked a core set of questions of each resident, following up with spontaneous probes to obtain clarity or to follow a new, relevant avenue of inquiry raised by participants. The questions elicited residents' views about their own learning, their understanding of SDL, whether and how they engaged in SDL, whether they engaged in component SDL skills, such as reflection or setting goals for their learning, and their view of the learning culture in the residency. Interviews were digitally audio recorded and professionally transcribed verbatim.

Data analysis

All four study authors engaged as a team in an iterative process of combined individual and collaborative data analysis. First, each team member independently read all interview transcripts and wrote analytic notes for each. The team then met regularly in person and by conference call to discuss each transcript in depth. We discussed the data from individual participants regarding the various study topics within the context of each transcript in its entirety. We also compared the data from the transcript under discussion with the data from those we had analyzed previously. This process allowed us to search repeatedly for alternative explanations for interpretations of the data and to rule them out or modify our initial interpretations over time. We generated major thematic categories agreed on by the group, discussed the range of viewpoints within each, and developed overarching interpretations of these findings.

Results

All 13 residents in the third-year class agreed to participate and completed interviews during the first quarter of their final year of training. Five were women, eight were men, and their average age was 33 years (range 28–44). Ten of these residents graduated from U.S. medical schools, and three were international medical graduates. Interviews averaged 21.4 minutes (range 14.4–30.5 minutes). Although we sampled all residents in the class, patterns and themes emerged by the sixth interview, and by the tenth interview, data saturation was reached.

We identified three major themes: resident beliefs about learning, the learning culture in residency, and developmental progress in learning.

Resident beliefs about learning

In discussing their own learning in residency, residents reported that clinical experience is the most potent stimulus for learning. Most residents valued active learning, reporting that they learn best "by actually doing things" and having responsibility for patient care; one explained that "the situations where I learned the most are where I feel like I was making the decisions." Residents reported being more engaged in learning that was clinically driven compared with studying self-selected topics. This was in contrast to the way in which most had learned during medical school, by attending lectures and reading about assigned topics. Some residents described having tried to continue learning as they had in medical school but realizing it was less effective in the new context. As one resident noted,

> if I'm not seeing anything about [a topic] or actively engaged in that process, I don't really recall what I'm reading that well … but if I see something and look it up at that point, then it's much easier for me to remember what I'm reading.

Consistent with the emphasis on clinical experience as the basis of learning, several residents acknowledged the importance of seeing a large enough volume of patients during training to be adequately prepared for independent practice. These experiences often generate clinical questions that could serve as learning opportunities. However, they expressed frustration about the difficulty of finding time to follow up on these questions in the context of their demanding schedules. Although they identified patient encounters as key triggers for learning, some also described patient care and

learning as separate, competing priorities and expressed that they needed more "time to sit down and study instead of doing my … charting" and that patient care time "needs to be balanced with time that's spent studying." Some residents expressed an outright preference for lecture-based teaching over clinical learning.

Despite not having received any specific orientation to SDL, many residents provided excellent definitions of SDL, evoking active learning, identification of learning needs and strategies, and setting goals. However, they often used negative terms such as "deficits" and "weaknesses" to describe the starting points for SDL, and many expressed some difficulty operationalizing the concept of SDL. One resident explained:

> I try to think about … what are my deficits and what are things I can do to maybe improve those, whether it be studying particular things or maybe particular text or maybe trying things differently, a different way of learning whether it be by cases or by just looking at articles…. I feel like I don't have a good structure, like I don't feel like I've really arrived at a good conclusion or a good style [of SDL].

Some described SDL as staying up late at night looking up information or reading a stack of journals or books at home, sorting through "a little corner of things I need to be working on." However, several reported that fatigue at the end of their long days limited their success at implementing this strategy. One resident described SDL as "another obligation, another thing that you have to do, to sit down and reflect or whatever."

Others expressed concern that intrinsic motivation for learning was inadequate; these residents valued more traditional, teacher-centered educational methods. For example, one resident related that "residency programs where you get pimped and you get beat down by your superiors are sort of forcing you to learn," whereas in our residency program, "if you don't know the answer they'll just be very nice and, like, try to help you out." Another mentioned that frequent testing in medical school promoted

> constant learning … and the mentality changed once I got here…. [I]nstead of being tested once a week or once a month, I wasn't tested anymore, and for

me, a lot of that motivation [of being tested] was the carrot.

Residents who engaged in goal setting focused almost exclusively on medical knowledge; most described identifying general topics about which they wanted to learn more and making plans to read about these topics. Only a few mentioned setting goals related to other competencies such as clinical skills. Some reported negative emotional reactions to goal setting, such as guilt at being unable to complete the goals they set. Residents made few comments about reflection on learning, and two residents actually noted that reflection was anxiety provoking because it made them more aware of their knowledge deficits.

Finally, many residents expressed a need for coaching or guidance to optimize their learning. When asked about reflection in the context of SDL, one resident explained:

> It's something where a little guidance would probably be helpful and necessary, because I certainly haven't done that on my own. Like I said, I just sort of learn the way I always thought I learned, which I think for most of us who have gotten into med school and residency, it works. Whether it's the best thing for us is a whole different question.

Even those who reported confidence in their learning styles wanted "someone … who could help us through" the transition to learning in residency, someone "pushing me toward self-directed learning." Residents envisioned this person helping them to set appropriate goals and identify effective learning strategies as well as providing motivation for SDL.

We noted individual differences among residents on several aspects of learning: confidence in their learning skills, effectiveness of their learning strategies, need for structure versus rejection of structure, comfort with uncertainty, and internal versus external motivation. Of note, individual residents sometimes expressed conflicting views on the above parameters even within the same interview.

Culture of learning

Residents described the learning culture in the residency program as one in which patient care was highly valued and individual interests were nurtured but in

which structure and guidance in learning were lacking. The tension between service and learning again emerged in the context of residency culture, with residents perceiving patient care as paramount, taking precedence over education. One argued that the residency's priority is "to treat patients and not necessarily to learn—I feel like that trumps a lot of things around here, that there is more desire to learn to be efficient than to take time to learn for ourselves." Several residents lamented a lack of protected time for didactic teaching, and they did not seem to recognize clinical supervision as a form of teaching. Several also expressed frustration with "busy work"—the administrative burdens, such as paperwork and charting, associated with patient care in the current system.

A positive aspect of the learning culture reported by residents in this program was a sense of a high level of responsibility for patients. Residents also noted autonomy in managing their own learning; however, in this realm, independence was not viewed favorably by most. Many residents did not feel adequately prepared to direct their own learning; they described their experience using metaphors such as "you are not spoon fed," "you have to do it on your own, sink or swim," or "you are just trying to keep your head above water most days." In contrast, some expressed more acceptance of this independence, noting that "to get to where we are, you have to have some experience with learning; you have to be an adult learner," and "you need to be a good self-directed learner … to be able to manage this on your own and be able to look things up."

Some residents reported that they do engage in goal setting, either alone or with their advisors, and that they set goals related to medical knowledge, organizational skills, and clinical skills. Some reported that their academic advisors focused exclusively on career goals rather than learning goals. They received support and encouragement to pursue their individual goals and passions in pursuit of self-actualization and found their advisors and faculty to be "nurturing" and motivating. They cited role modeling by faculty who look up information in the residents' presence: "[I]t doesn't make you feel bad when you

have to [look things up] because everybody does it."

Developmental progress in learning

Evidence of a developmental progression in the learning process during residency emerged from these interviews. Residents often described the first year as a time of "survival" and feeling overwhelmed, with learning opportunities being limited by fatigue and patient care responsibilities. In the second year, they were able to "recover from intern year" and reach a "comfort zone"; they identified this as the best time to introduce SDL curricula. A recurring theme to describe the mood of the third (final) year was "panic." Many expressed uncertainty about the adequacy of their knowledge base. One resident related that

> you just start second guessing a lot of things as you're getting ready to be out on your own—have I learned enough? Do I know all the things I'm supposed to know at this point? How am I going to keep learning?

They worried aloud that the third year was their "last chance" to learn all they needed to know, revealing a lack of confidence in their lifelong learning skills. Some found that their fear motivated them "to start reading more" or to "integrate … self-directed learning into my daily existence." On the other hand, several residents felt that learning during the third year was more manageable. At this stage in their training, they were more motivated to take responsibility for their learning because they had more time available and more clinical experience to connect with their learning.

Despite this "third-year panic," most residents described a sense of increased control over their learning as time progressed in the residency. Some noted greater ability to manage ambiguity and more confidence to search for information independently. However, two residents noted that they saw no progression in their learning during residency, and one noted that the general lack of control in residency detracted from the potential for having control over one's learning.

> [E]very month you're told your schedule and you're told where to be and there's really like very little time for you to be like, "hey I want to do this" unless it's on your own time and that time is something few and far between.

In this sample of 13 graduating residents, we did not note any trends by age, sex, or medical school location (U.S. versus international).

Paradoxical beliefs about learning

Four apparent paradoxes emerged from our analysis of resident perspectives on learning:

1. Residents have a general understanding of the construct of SDL and have role models and resources for SDL, but they engage in limited goal setting and reflection and report lack of skills to manage their own learning.

2. Despite working with nurturing faculty in what should be a learner-centered educational culture, many residents value traditional, teacher-centered approaches, and some yearn for external pressure to motivate learning.

3. Residents recognize patient care as the most powerful stimulus for SDL, but they lament that time dedicated to patient care detracts from opportunities to learn (i.e., they uncouple patient care and learning).

4. Residents recognize a need for external guidance to optimize SDL.

Discussion

Clinical experiences serve as the foundation of learning in residency. In the learning framework described by Teunissen and colleagues,[8] residents expand their knowledge through interpretation of experience and construction of meaning. This seems to occur through a process of reflection on clinical experience, which is assisted by guidance from faculty.[9] Although residents in this study recognized patient care as a potent trigger for learning, many perceived patient care and learning as competing priorities. Several explanations for this are possible. Residents may be more comfortable with traditional educational strategies (e.g., lecture-based teaching, textbook reading, and frequent written tests) that still dominate many medical school curricula, and they may lack the skills needed for optimal learning in clinical settings. Residents may also be frustrated by the time consumed by patient care tasks that are perceived as noneducational, such as the administrative burdens of the U.S.

medical system. Alternately, the perception that patient care detracts from learning may be a result of current working conditions; Hoff and colleagues[10] note that with duty hours limits, residents' work is condensed into shorter time periods, and, consequently, the culture of training becomes less learning oriented. In addition, faculty may be less available because of increased demands on their time, and learning is often interrupted for mundane activities such as returning pages and completing paperwork. This observation was supported by our residents, who wanted more protected time for structured formal learning activities. Additional duty hours limits enacted in 2011 aim to reduce resident fatigue, ideally allowing more time and energy for self-directed activities.[6] However, without commensurate reductions in residents' service and administrative burdens and efforts to prioritize resident learning, reduced work hours could intensify the pressures that hinder learning.

When discussing their learning and goal setting, most residents in our study focused primarily on medical knowledge, consistent with the traditional biomedical model, which focuses on treatment of disease through identification of structural and functional abnormalities in the body and attempts to reduce or avoid uncertainty and complexity.[11] Primary care physicians, however, commonly face clinical situations complicated by uncertainty, such as medically unexplained symptoms and complex psychosocial contexts of illness. Evans and Trotter[12] posit that the biopsychosocial model, a holistic approach that integrates biological, psychological, and social factors to understand the patient's experience of health and illness, may provide physicians with conceptual resources that facilitate managing breadth and complexity in practice. They found that primary care physicians who endorsed a biomedical epistemology reported more stress reactions to uncertainty than did those with a biopsychosocial epistemology. Moreover, practice within a biopsychosocial framework implies mastery of competencies beyond medical knowledge, such as communication skills, professionalism, systems-based practice, and practice-based learning. Promoting competency-based education and a biopsychosocial approach in residency

culture may therefore help expand the focus of residents' SDL to a broader range of professional competencies as well as better prepare physicians to address the complexity and uncertainty of primary care practice.

Several additional features of the deficit-driven and, at times, abusive culture of traditional medical education emerged in some resident views[11]: public humiliation ("pimping"), guilt over knowledge deficits, and focus on outcomes over process. Surprisingly, a number of residents expressed nostalgia for this traditional approach and appreciation for the external motivation it provides. Until these aspects of the hidden curriculum are thoroughly addressed, some learners will have difficulty embracing a self-directed approach.

A common developmental portrait among these residents was one of moving from survival mode to recovery, with many developing a sense of panic in the third year in anticipation of independent practice, perhaps due to lack of confidence in their ability to manage their own learning. However, most did express an increasing sense of control over their learning as they progressed through their training. These senior residents valued autonomy in patient care but felt that they had too much autonomy in learning. In the current climate of increased focus on patient safety, residents have more supervision and support than did their predecessors, but, to be successful lifelong learners, they also need more support and guidance in learning. A study of medical students' SDL in the clinical environment concluded that support and guidance are necessary for optimal learning, noting that students defaulted to self-direction when these were not provided.[13] This apparent contradiction—that SDL requires external facilitation—is consistent with Knowles' model of SDL, in which the role of the educator is a facilitator, needed to guide self-assessment and reflection on feedback.[5] Recent research on feedback and reflection among family physicians also emphasizes the importance of facilitation to enhance the reflective process.[14] Furthermore, given some residents' reported lack of intrinsic motivation, they will need faculty guidance to enhance motivation for SDL. These findings illustrate the struggle in

residency education to balance adequate supervision with resident responsibility and autonomy, with gradual withdrawal of supervision as residents progress toward competent independent practice governed by SDL, and they underline the need for an effective intervention to foster SDL, so that readiness for safe, independent practice is achieved earlier than is the perception of the present sample.

The paradoxes noted above demonstrate that these residents have, to some degree, moved beyond the safety net of the biomedical, teacher-centered, and externally motivating traditional model of learning but have yet to fully embrace SDL. In the transition between these two modes of learning, they are caught in a painful "split," unable to fully enact the new model. We have borrowed this terminology from the "split biopsychosocial model" coined by Doherty et al.[15] They describe a transitional state in which practitioners have blended the biomedical model and the biopsychosocial model. In this split state, physicians are still sufficiently attached to the old model that they can engage the new one only in a very limited way. The residents in our study seem to be stuck in a similarly unsatisfying "split SDL" approach.

Our findings and the current literature on SDL suggest possible steps to address these paradoxes and to help residents to fully embrace a self-directed approach to learning. First, we should study interventions aimed at teaching residents skills to manage their own learning. In the context of residency, applying the strategies they bring from medical school may be ineffective; they need to develop strategies to optimize learning from clinical experiences, both during residency and for the remainder of their careers. The literature on work-based learning and lifelong learning should inform these interventions. When effective interventions are identified, we will need to develop faculty skills to provide structure and guidance for SDL, such as facilitating reflection on learning. Second, medical educators need to encourage continued change from the traditional culture of residency to a more learning-oriented culture, emphasizing activities such as feedback, sharing experiences, and individual and group reflection. This will require changes to

the current resident work environment to reduce resident fatigue, optimize the clinical workload, and minimize administrative activities that have little educational value.[10] Stinson and colleagues[16] placed valuing lifelong learning at the top of a list of recommendations to promote an organizational culture of learning in health professions education. Whether changes in workplace culture can promote more effective approaches to learning also requires study.[17] In light of the systemic factors that constrain resident learning in the current system, including clinical service needs, heavy documentation burdens, and limited work hours, major structural changes may be needed in residency curricula, hospitals, and health care systems in order to truly promote SDL. On the other hand, additional work hours limits should reduce resident fatigue, perhaps mitigating their intense stress and freeing time and mental energy for goal setting and reflection on clinical experience.

The results of this study are subject to several limitations. First, our data represent the views of residents from one class in a single program, limiting the range of transferability of findings to other settings. However, anecdotally, when we presented these data to residency educators at other programs, they recognized similar sentiments among their trainees. This residency is a fairly typical family medicine training program based at a community hospital, and extensive common requirements for family medicine residency accreditation by the ACGME ensure a great deal of curricular uniformity among residency programs. Second, several months before these interviews, changes in the structure of a major clinical rotation resulted in our residents temporarily having difficulty in attending some didactic conferences. This may have influenced interviewees to emphasize a need for more lecture-based teaching, resulting in the finding that the learning culture emphasized patient care over resident teaching. Thus, this component of our findings may be less generalizable and may warrant additional future study. Third, because we informed participants that the transcripts, though anonymized, would be reviewed by residency administrators, social desirability bias may have influenced their responses to some extent. However, we presented the

interview as an opportunity to shape the upcoming project to improve learning for future residents, and many participants provided comments critical of the program culture and structure.

Conclusions

In summary, senior residents in this study provided accurate definitions of SDL and viewed SDL as a necessary, desirable competency. However, many reported a lack of skills to manage their own learning. Less-than-adequate goal setting, lack of reflection, a preference for lectures and random readings, frustration over inadequate time to follow up on patient-related triggers for learning, and not taking full advantage of a supportive and resource-rich setting often characterized resident learning. A new curriculum in this residency program attempts to provide residents with guidance and skills to embrace SDL[18]; its success will require changes in the residency culture and environment to support SDL.

References

1 Pugno PA, McGaha AL, Schmittling GT, DeVilbiss Bieck AD, Crosley PW, Ostergaard DJ. Results of the 2010 National Resident Matching Program: Family medicine. Fam Med. 2010;42:552–561.

2 White CB, Gruppen LD. Self-regulated learning in medical education. Association for the Study of Medical Education: Understanding Medical Education Series. Edinburgh, UK: Association for the Study of Medical Education; 2007.

3 Quirk ME. Intuition and Metacognition in Medical Education: Keys to Developing Expertise. New York, NY: Springer Publishing Company, Inc.; 2006.

4 Knowles M. Self-Directed Learning: A Guide for Learners and Teachers. New York, NY: Association Press; 1975.

5 Murad MH, Varkey P. Self-directed learning in health professions education. Ann Acad Med Singapore. 2008;37:580–590.

6 Accreditation Council for Graduate Medical Education. Common Program Requirements. http://www.acgme-2010standards.org/pdf/Common_Program_Requirements_07012011.pdf. Accessed August 21, 2011.

7 Westberg J, Jason H. Fostering learners' reflection and self-assessment. Fam Med. 1994;26:278–282.

8 Teunissen PW, Scheele F, Scherpbier AJ, et al. How residents learn: Qualitative evidence for the pivotal role of clinical activities. Med Educ. 2007;41:763–770.

9 Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: A systematic review. Adv Health Sci Educ Theory Pract. 2009;14:595–621.

10 Hoff TJ, Pohl H, Bartfield J. Creating a learning environment to produce competent residents: The roles of culture and context. Acad Med. 2004;79:532–539. http://journals.lww.com/academicmedicine/Fulltext/2004/06000/Creating_a_Learning_Environment_to_Produce.7.aspx. Accessed August 15, 2011.

11 Haidet P, Stein HF. The role of the student–teacher relationship in the formation of physicians. The hidden curriculum as process. J Gen Intern Med. 2006;21(suppl 1):S16–S20.

12 Evans L, Trotter DR. Epistemology and uncertainty in primary care: An exploratory study. Fam Med. 2009;41:319–326.

13 Dornan T, Hadfield J, Brown M, Boshuizen H, Scherpbier A. How can medical students learn in a self-directed way in the clinical environment? Design-based research. Med Educ. 2005;39:356–364.

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

15 Doherty WJ, Baird MA, Becker LA. Family medicine and the biopsychosocial model: The road toward integration. Marriage Fam Rev. 1987;10:51–69.

16 Stinson L, Pearson D, Lucas B. Developing a learning culture: Twelve tips for individuals, teams and organizations. Med Teach. 2006;28:309–312.

17 Delva MD, Kirby J, Schultz K, Godwin M. Assessing the relationship of learning approaches to workplace climate in clerkship and residency. Acad Med. 2004;79:1120–1126. http://journals.lww.com/academicmedicine/Fulltext/2004/11000/Assessing_the_Relationship_of_Learning_Approaches.25.aspx. Accessed August 15, 2011.

18 Nothnagle M, Goldman R, Quirk M, Reis S. Promoting self-directed learning skills in residency: A case study in program development. Acad Med. 2010;85:1874–1879. http://journals.lww.com/academicmedicine/Abstract/2010/12000/Promoting_Self_Directed_Learning_Skills_in.25.aspx. Accessed August 15, 2011.