

The learning culture in third year clerkships: medical students' perceptions through a coaching lens

Daniel J. Rosenkrans, Debra L. Klamen and Nicole K. Roberts

Corresponding author: Dr. Debra Klamen, dklamen@siu.edu

Department: Southern Illinois University School of Medicine, 801 N. Rutledge St., Rm 3050, Springfield, Illinois 62794.

Received: 12/03/2015

Accepted: 18/03/2015

Published: 18/03/2015

Abstract

Purpose: Medicine is rapidly changing. New clerkship models have been proposed, including coaching. The authors studied a group of individuals able to comment on both worlds: medical students who had been coached to high levels of performance in sports, music, and debate. The study was undertaken to understand the learning culture in the clerkships and whether it was similar to the students' previous coaching experiences.

Method: Using a constructivist grounded theory approach, the authors conducted two focus groups with 23 students. Data were analyzed iteratively using constant comparison. Key themes were identified to obtain a conceptual understanding of coaching and clerkships.

Results: Five types of learning events regularly occurred between coaches and students, and a sixth was unique to medical students in the clerkships. These were: relationship with the teacher, expectations, observation, practice, feedback, and measures of success (in the clerkships). The five events associated with coaching were noted as strengths by students, while the same five were noted as weaknesses in the clerkships.

Conclusion: Medicine's current learning culture makes it difficult for teachers to impact learners' development, making thoughts about incorporating coaching into clinical settings problematic. The culture must be addressed, so that coached deliberate practice may be used.

Medical training began with an apprenticeship model for learning clinical skills. Although there were certainly disadvantages to this kind of training as reflected in the Flexner report, the apprenticeship model did have its advantages. The function of apprenticeships is to bring learners from the periphery of participation (as an observer) progressively into the center of a community of practice as their skills improve (Lave & Wenger, 2003). That is, master physicians had their apprentices simply observe in the beginning, but gradually increased their involvement in patient care until they could care for patients as competent physicians. The speed of this evolution was determined by the master, based on a longitudinal relationship with his apprentice and hours of direct observation, practice and feedback. This required skills on the part of the master very similar to that of a coach today, although it is doubtful that the masters called what they were doing by that name.

Keywords: Medical Education – general, student study/learning styles and learning styles and mentoring.

Article

Introduction

Medicine has come a long way since the master-apprentice model was the only method employed to educate future doctors, and the learning environment has changed dramatically. Although clinical experiences may occur sporadically in the first two years of medical school, the majority of same occur in the clinical clerkship year (third year of training in U.S. medical schools.) This year is usually divided up into segments of varying lengths in which students rotate through a variety of specialties (typically Family and Community Medicine, Internal Medicine, Psychiatry, Obstetrics/Gynecology, Pediatrics and Surgery). However, there is evidence that what we think is going on in clinical clerkships might not actually be what is happening (William et al, 2008; Williams et al, 2011; Han et al, 2014). External calls for change are also occurring (Irby et al, 2010; Christensen et al, 2009; Task Force on Academic Health Centers, 2002; Institute of Medicine, 2003a; Institute of Medicine, 2003b). Coaching has been suggested as a solution for some of the problems seen in current clinical medical education settings (Davis et al, 2006; Gawande, 2011). Coaching in music, sports, and a variety of other performance-based fields has been well-studied (Ericsson, 1996). Many fields have turned to coaching to train employees, educators, etc., when their usual methods fail to produce desired results (Contu and Kauffman, 2009; Muir, 2009; McGuffin & Obonyo, 2009; Levine, 2012; Chval et al, 2010; Showers & Joyce, 1996).

The problem is that a focus on the individual learner does not take into account the learning environment in which the training is occurring. We know little about the interplay between individual and socio-cultural influences on coaching. This knowledge is essential if we would like to propose a coaching model in medical education capable of success. We studied a unique group of individuals able to comment on both worlds: upper level medical students who had been coached to high levels of performance in sports, music, and in one case, debate, before entering medical school.

As these trainees went from one role to another, we wondered how much of their experiences being coached were similar or different as compared to their experiences as medical students rotating through third year clinical clerkships. We undertook this study to understand the learning culture in the clerkships and whether it was similar to the coaching experiences our students had previously. If the latter, we hoped to better understand the implications of proposing a coaching experience for medical students in their clerkships.

Method

This study was categorized as a non-research activity by Southern Illinois University School of Medicine's IRB in 2013.

We used a constructivist grounded theory approach to explore students' perceptions of their clinical clerkship experiences so that we could understand what is happening within a clerkship setting. Both the vantage points of the participants and the researchers must be taken into consideration, since the data emerges from the interaction between them. Researchers must reflect on their own backgrounds, and share these to allow a more meaningful interpretation of the study. The lead author (DR) was at the time of this study a 4th year medical student with a special interest in medical education; he is now a resident at a different institution. (He participated as a researcher only and was not interviewed as part of the sample of student participants.) Working with him was (DK) a doctor with extensive experience in medical education, and a collaborator with significant expertise in both education and qualitative methodology (NR). Purposive sampling of learners who had a background in debate, music or sports and were also third or fourth year medical students was done. This sampling strategy requires selection of participants the researchers consider likely to provide rich information relevant to their research question (Watling & Lingard, 2012). Like medicine, debate, music and sports are performance-oriented, however, these fields use a coaching-type learning model, unlike medicine (Cooke et al, 2010). All participants were from one medical school. Initial contact was made by an email sent to all third and fourth year medical students describing the profile of the individuals we were looking for and

inviting their participation. Students responding by email were contacted by DK for a brief discussion of their background to ensure they were appropriate for the study. Twenty-four participants were originally qualified to enter the study; one ultimately withdrew due to scheduling difficulties. The students had backgrounds in music (n=11, with 5 fourth year students and 6 third year students), sports (n=11, with 2 in the fourth year and 9 in the third year), and one third year student with an extensive background in competitive debate.

Focus groups were semi-structured and 90 minutes in length, with general questions about the students' experiences being coached and their experiences learning in clinical clerkships followed by open-ended questions to elaborate upon these experiences of learning in each of these cultures. The two focus group discussions that were held were captured through the use of extensive, and where possible, verbatim notes kept by the primary interviewer (DK) and (NR). There were 16 students in the first focus group and 7 in the second. Data were analyzed using the constant comparative approach commonly used in grounded theory (Corbin & Strauss, 2008). Consistent with this approach, the process of data collection and analysis was iterative. Themes identified in the initial focus group were explored in more depth in the second focus group, and thematic categories were identified.

Coding of the data into key themes was done using Atlas.ti v.7.1.8. (Atlas.ti Scientific Software Development, GmbH, Berlin, Germany). Initially each author separately examined the written notes of the first focus group to identify themes. The authors then met together to discuss what they had found. Themes identified in the first focus group were compared repeatedly and coding categories were defined to organize the data. This initial coding scheme was then applied to the second focus group, and categories were re-examined and refined. The three authors did this work apart, and then together at regular intervals throughout this process. Once the coding scheme was completed, the authors examined relationships among the categories to raise the analytic level from categorical to conceptual to make the analysis more meaningful. Saturation was achieved by the end of the second focus group (Morse, 1995). Saturation implies that there was collection of sufficient data to allow an adequate understanding of the properties of the concepts that formed our initial research question.

Results

We identified five types of learning events that regularly occurred between coaches and students, and a sixth unique to medical students in the clinical clerkship environment. Figures 1 and 2 characterize the events as they occurred in the two environments. (Insert Figures 1 and 2 here) The six types of events were: relationship with the teacher, expectations, observation, practice, feedback, and measures of success. Following is a description of each of these concepts in greater depth, with representative quotations from participants.

Relationship with teacher

When asked to compare and contrast the differences between being a learner in a coached performance (music/sports/debate) versus a medical student in a clinical clerkship, students noted that they had long-term relationships with their coaches who came to know them very well. (Range of coaching experiences was from a minimum of 2 years to 10 for our participants.) This relationship allowed the coach to recognize the individual background of each student, and tailor comments and activities to help the individual improve.

“They ‘knew me’ as a person. There was a relationship there.”

“We are the focus, not a bystander.”

“Coaches could adjust their techniques, it was not ‘one size fits all’.”

In contrast, clinical clerkship relationships between students and teachers were characterized as very short, with the focus on the patients, not the learners.

“We don’t spend enough time with one person for them to get to know you and for you to get to know them. You’re on a rotation for 6 weeks, but you’re lucky to spend 2 days with one person.”

“When you change teachers they have to start over and their expectations may be too high or too low because they don’t know you.”

“Physicians have their patients and their lives. You aren’t their #1 priority.”

Expectations

Students characterized their work with coaches being full of specific goal setting, tailored to the individual. Activities were often sequentially staged to meet the needs of the improving student. Expectations were high as to the performance level that could be achieved, and were also very clear to both student and coach. This had the effect of motivating the students to work harder, which in turn helped build confidence.

“We worked on each phase separately. We worked on specific deficits and position.”

“(I was given) critical feedback – ie, you need to tweak this..... (Then when I heard) well done it was an ego boost.

“They (coaches) push you.”

“Tailor the method to the individual, then establish standards for the group (drills) too. So one-on-one takes a different approach than group methods, and changes for the individual.”

Conversely, clinical clerkship experiences were characterized as having no clear goals, with expectations changing frequently because teachers rotated frequently and each had individual differences as to how they thought something needed to be done. Students also felt as if they were being evaluated every time they met with a faculty member, not taught.

“You don’t know what to expect with each physician. There are lots of different ways to do the same thing – there is no explicit one way to do it”

“I don’t get pushed to perform better, because they don’t know how to push me.”

“There were no real educational goals....there were lectures for that.”

“There was a different teacher every week and you would learn different techniques and then expect to get better.”

“Physicians were there to assess what you know and grade you.”

Observation

Students in coaching situations noted that observation was plentiful and the main goal of the observation was to identify specific strengths and weaknesses and develop a program of practice to remedy the deficiencies. Often component parts of the overall skill (for example, piano playing) were broken down into smaller steps before being put back together into a complete performance.

“The coach would have you doing only the hard part (of the piece) repeatedly. I was stopped often when it was incorrect so I couldn’t create bad habits.”

“(The coach was) dividing tasks down to their component pieces – catching, not just shooting – miniscule steps – eventually you could put it all together.”

“Coaches teach you how to practice and then they watch you.”

In comparison, medical students on a clinical clerkship often felt that their role in the clerkship was that of an observer, not a doer.

“Some (residents) are like we don’t have time for that; the learning opportunity gets taken away. I found there are a lot of opportunities that get taken away.”

“If you are bad, they (physicians) tell you to go home and practice.”

“There is no one critically looking at our histories and physicals.”

“They (faculty) tell us ‘you’ll learn that later’ or ‘teach yourself.’

Feedback

Coaching situations provided students with feedback that was constant, detailed, and actionable. It immediately followed the action that was observed, and both student and coach worked together on improving the performance.

“During athletics there is constant feedback, not in 3 weeks (like the clerkships).”

“They (the coaches) identified what I did bad....and taught me (how to fix it).”

“(In) coaching, critical feedback is the most critical aspect, so you know what you’re doing well and getting feedback on tweaks or changes to pull.”

“There were measurable goals that you were both working toward (student and coach).”

Clinical clerkship feedback was characterized as disembodied from the actual event, at the middle and end of the clerkship only or completely absent. There was often no follow up to feedback that was given, to see if the student had actually worked on the deficient skill. This gave students a false sense of doing well, because they believed that if they hadn’t heard anything they must be doing satisfactorily.

“There is not a lot of feedback.”

“Difference between athletics and third year is athletics is constant feedback, the coach talks to you in practice. In school feedback comes at the end, disembodied, false sense that you’re doing ok. They (coaches in athletics) would never say, ‘oh, let’s see if he misses three more shots and then talk to him’.”

Practice

Coaching situations provided ample opportunities for practice, through planned activities, improvement through repetition, specifically addressing weaknesses with homework, and staged hierarchical exercises.

“Tricky pieces were broken down into smaller exercises, once they were managed it made the rest easier.”

“We would have the priority of one thing over all others (for a while) and then focus on something else.

“In steeplechase we were told what we did well versus what we needed to work on....small things...we never got to perfection.”

“We had homework – ‘mini-goals’ along the way.”

On the other hand, practice in the clinical clerkship realm came about in an opportunistic or idiosyncratic way, with no standardized performance to compare oneself too, and insufficient practice opportunities to develop competency. There was no mention by the students of homework given, much less homework being checked by faculty in clerkship settings.

“In the third year there is a list of what you should see, but we don’t do enough to get the skill.”

“(We were) not very pushed third year.”

“In the IM clerkship we showed up, and (if we) told them enough, (they) stopped asking.”

“(I) didn’t feel that the third year was to build clinical skills. It was knowledge building toward Step 2 in a different setting. (You) just got through the hospital so you could get home and study.”

Measures of success

While students speaking about their experiences being coached did not talk about being assessed by their coaches (a summative judgment about performance), measures of success were brought up frequently when the students talked about their clerkship experiences. Measures discussed included showing up, teaching yourself, impression management and the shelf exams (and ultimately Step 2 CK). Students expressed a concern about looking ‘too opportunistic’ when asking for patient experience.

“If you don’t know something you give the wrong impression to start – what it looks like you do is more important than doing it.”

“Are my scores lower than they should be because they don’t get to know me?”

“Faculty are impressed when you come with skills. They like that. If you come with a deficit, you are seen as bad.”

“With violin I wanted my teacher to think I played well, but that wasn’t the end goal. In clerkship the main goal is to impress the attendings and the residents, not to see how much you can improve from the experience.”

“The clinical got in the way of the study for the shelf.”

“I found that there are a lot of opportunities that get taken away. Sometimes you want to bring it up and sometimes you don’t because it’s all about the patient, you can’t say that you wanted the opportunity, because you are looking out for yourself, not the patient.”

Discussion

Shulman, discussing his concept of signature pedagogies (the specific characteristic forms of teaching and learning that occur within professions) noted that although they make for efficient learning, they become plagued by tunnel vision and thus need to periodically compare themselves with other methods of teaching and learning to broaden their thinking (Shulman, 2005). This approach has been used to provide important insights into other fields (Golde, 2007; Schrand & Eliason, 2012), suggesting that perhaps we would do well to compare medical education with other learning fields to enhance our own curricula.

We identified five sources of influence that a coaching framework has in the learning situations of sports, music, and debate. Interestingly, we discovered that students were describing their experiences being in a coaching environment using elements from deliberate practice (expectations, practice, observation and feedback)(Ericsson et al, 1993) in addition to the need for a strong, safe, and trusting relationship between teacher and learner (Cushion et al, 2006; Watling et al, 2014).

Our results suggest that the characteristics of coaching presented by our students starkly contrast the characterization of instruction in clerkships. The majority of our students' experiences during this time were opposite that which they experienced with coaching. While the same 5 categories of coaching influence emerged from the students' perceptions of the clerkships, they were characterized negatively in that setting. The sixth category, measure of success, was emphasized in clerkship learning events by the students but was not present in coaching, likely because measuring success (summative assessment) is rarely in the hands of the coach. Many of our students felt that success in the clerkships was measured by the students' ability to impress faculty and perform well on standardized tests, such as the National Board of Medical Examiner's shelf exams and USMLE Step 2, versus improving their diagnostic, management and physical exam skills toward better patient care.

Several studies have reported results parallel to our own in relation to feedback and observation (Watling et al, 2014; Watling et al, 2013). For example, these studies found that medical learners complained feedback lacked specificity and immediacy and as such was not seen as credible. Medical learners in both studies noted they frequently received feedback on unobserved performances (ie presenting the case to their supervisors as a proxy for seeing the patient while observed by the supervisor) and were otherwise rarely observed. Our students commented upon the same phenomenon. There was also little doubt in the minds of the medical learners in the two studies that their teachers had dual roles as supervisors and clinicians, and there was little doubt as to who took precedence (patient care over teaching). The same was true of our students.

Our study supports the notion that students do not perceive their experiences being coached as similar to their learning experiences in clinical clerkships. Instead of gradually becoming more involved in patient care while building clinical skills, student participation remains peripheral and fragmented. None of the comments indicated a functional medical student-teacher relationship in which faculty can adequately assess students, and students are comfortable admitting their deficiencies. Instead, the comments suggest a superficial relationship with multiple faculty who spend limited time engaging students. Without continuity between faculty and students, effective feedback cannot be delivered nor received. Without effective feedback, students cannot be expected to efficiently improve performance when they have limited means of identifying and remedying their deficiencies. If dedicated practice is an essential element in clinical teaching, it would appear that our current clinical training system comes up short (Davidoff, 2011). Perhaps this is why our students considered measures of success dependent on standardized exams, versus their evaluations from faculty members. It is difficult for students to assign credibility to an assessment from faculty, and therefore use it to improve clinical skills, if they do not feel that faculty members know them well enough to accurately evaluate them. It appears faculty feel the same way (Dudek et al, 2005).

There may be opportunities in the current medical education system to allow for a training experience more closely approaching coached deliberate practice. One model with promising results in this area is that of longitudinal integrated clerkships (Bates et al, 2013; Hirsh et al, 2012). The success of this model will depend on longitudinal relationships between one student and one faculty member as was true in apprenticeship training models. Other models have been proposed including a longitudinal critical clinical competency curriculum with a radically revised third year (Klamen, 2015) and the integration of technology into clerkships, such as simulation, providing students with repetitive structured practice scenarios while receiving immediate feedback (Bradley, 2006).

Given the mounting concerns about our current educational practice, numerous calls for change, and a voluminous body of evidence demonstrating the effectiveness of coached deliberate practice in other disciplines, the field seems ripe for this shift to occur. We can no longer rely on students passively navigating through rotations with unattainable lists of objectives, all while hoping they receive adequate clinical experiences and competently build clinical skills. Instead, we must reengage them and provide the continuity necessary for the development of meaningful, longitudinal relationships with faculty. In doing so, we may enable our faculty to better assess student development, accurately deliver feedback, and accelerate student progression toward competency. Medicine is fortunate to have a highly motivated student body with an equally ardent faculty that strives to maximize student potential. However, just as we do not expect beginning medical students to be master clinicians, we should neither believe that faculty members are uniformly

advanced in their teaching skills. The framework for faculty development in both coaching and deliberate practice has begun to be developed (Gifford & Fall, 2014), however much more attention on training is necessary.

Our study was limited by the use of field notes instead of verbatim transcripts from audio- or videotapes, which may have limited our interpretation of student responses. Our study was also limited to that of one medical school. We know that there are faculty who provide effective feedback in medical education in our current clinical clerkships, but this is spotty and thus may have been under-represented by the students in our sample, especially since they were comparing it with the near-constant feedback that is available in competitive sports, music or debate.

Conclusion

Although music, sports and competitive debate are not medicine, they have been the substrate for examination of the acquisition of expert performance in a complex skill. We believe that medicine's current learning culture is making it difficult for its teachers to meaningfully impact its learners. The current clinical practice environment makes incorporating coaching into clinical settings difficult, if not impossible to occur. As educational goals shift from process-based to outcome-based (Nasca et al, 2012), we must continue to cultivate effective teaching techniques, such as coached deliberate practice, and integrate their use with clinical practice, to ensure our medical students achieve milestones essential to success. Summarizing our thoughts as a result of this study, we offer the following as explicit feedback to this end.

1. Extend the period of time in which students and their assigned faculty members interact so that relationships become safe places where feedback is expected and thought to be credible.
2. An extended relationship would also make it possible for more individualized, targeted feedback to occur, based on increased amounts of direct observation of the student by the faculty, and thus an increased opportunity for practice at increasingly complex levels.
3. Link feedback to explicit practice plans so that students can strategically improve their performance.
4. Decouple assessment from coaching.
5. Explicitly reward faculty for excellence in teaching and afford them protected time to teach.

Acknowledgements

Acknowledgements: The authors would like to thank Anna Cianciolo, Jeanne Koehler, and Reed Williams for their careful review and invaluable suggestions for improving this article.

Declarations of Interest

The authors report no declarations of interest.

Notes on Contributors

Dr. Rosenkrans is a PGY1 Anesthesiology resident at University of North Carolina Hospitals, Chapel Hill, NC.

Dr. Klamen is the Associate Dean for Education & Curriculum and Professor and Chair, Department of Medical Education, Southern Illinois University School of Medicine, Springfield, IL.

Dr. Roberts is the Assistant Dean for Medical Education and Faculty Development, Sophie Davis School for Biomedical Education, City University of New York, New York, NY.

Bibliography

- Bates J, Konkin J, Suddards C, Dobson S, Pratt D. 2013. Student perceptions of assessment and feedback in longitudinal integrated clerkships. *Med Ed* 47:362-374. Doi: 10.1111/medu.12087
<http://dx.doi.org/10.1111/medu.12087>
- Bradley P. 2006. The history of simulation in medical education and possible future directions. *Med Ed* 40:254-262.
<http://dx.doi.org/10.1111/j.1365-2929.2006.02394.x>
- Christensen CM, Grossman JH, Hwang J. 2009. *The Innovator's Prescription. A Disruptive Solution for Health Care.* McGraw Hill: New York, USA. pp. 337-368.
- Chval, K, Arbaugh F, Lannin J, van Garderen D, Cummings L, Estapa A, Huey M. 2010. The transition from experienced teacher to mathematics coach: establishing a new identity. *The Elementary School Journal.* 111(1):191-216.
<http://dx.doi.org/10.1086/653475>
- Contu, D. & Kauffman, D. 2009. What can coaches do for you? *Harvard Business Review.* January:1-7.
- Cooke M, Irby DM, O'Brien BC. 2010. *Educating Physicians. A Call for Reform of Medical School and Residency.* Jossey-Bass: California, USA.
- Corbin J, Strauss A. 2008. *Basics of Qualitative Research,* 3rd ed. Sage Publications: California, USA.
- Cushion CJ, Armour KM, Jones RL. 2006. Locating the coaching process in practice: models 'for' and 'of' coaching. *Phys Educ Sports Pedagog* 11(1):83-99.
<http://dx.doi.org/10.1080/17408980500466995>
- Davidoff F. 2011. Music Lessons: What Musicians Can Teach Doctors (and other Health Professionals). *Ann Intern Med.* 154(6):426-429. doi: 10.7326/0003-4819-154-6-201103150-00009
<http://dx.doi.org/10.7326/0003-4819-154-6-201103150-00009>
- Davis DA, Mazmanian PE, Fordis M, Van Harrison R, Thorpe KE, Perrier L. 2006. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA* 296:1094-102.
<http://dx.doi.org/10.1001/jama.296.9.1094>
- Dudek NL, Marks MB, Regehr G. 2005. Failure to Fail: The Perspectives of Clinical Supervisors. *Acad Med.* 80(10):S84-S87.
<http://dx.doi.org/10.1097/00001888-200510001-00023>
- Ericsson KA ed. 1996. *The Road to Excellence: The Acquisition of Expert Performance in the Arts and Sciences, Sports and Games.* Lawrence Erlbaum Associates, Inc.: New Jersey, USA.
- Ericsson KA, Krampe RT, Tesch-Romer C. 1993. The Role of Deliberate Practice in the Acquisition of Expert Performance. *Psychological Review* 100(3):363-406.
<http://dx.doi.org/10.1037/0033-295X.100.3.363>

Gawande A. 2011. Personal Best: top athletes and singers have coaches. Should you? *The New Yorker*, 3 October.

Gifford, KA and Fall, LH. 2014. Doctor Coach: A Deliberate Practice Approach to Teaching and Learning Clinical Skills. *Acad Med* 89(2): 272-276. doi: 10.1097/ACM.0000000000000097
<http://dx.doi.org/10.1097/ACM.0000000000000097>

Golde CM.2007. Signature pedagogies in doctoral education: are they adaptable for the preparation of education researchers? *Educ Res* 36:344-51. doi: 10.3102/0013189X07308301
<http://dx.doi.org/10.3102/0013189X07308301>

Han H, Roberts NK, Korte R. 2015. Learning in the real place: medical students' learning and socialization in clerkships at one medical school. *Acad Med* 90(2):231-239. doi: 10.1097/ACM.0000000000000544
<http://dx.doi.org/10.1097/ACM.0000000000000544>

Hirsh D, Gaufberg E, Ogur B, Cohen P, Krupat E, Cox M, Pelletier S, Bor D. 2012. Educational Outcomes of the Harvard Medical School-Cambridge Integrated Clerkship: A Way Forward for Medical Education. *Acad Med* 87(5):643-650. doi: 10.1097/ACM.0b013e31824d9821.
<http://dx.doi.org/10.1097/ACM.0b013e31824d9821>

Institute of Medicine. 2003a. *Academic Health Centers: Leading Change in the 21st Century*. National Academy Press, Washington, DC, USA.

Institute of Medicine. 2003b. *Health Professions Education. A Bridge to Quality*. National Academy Press, Washington, DC, USA.

Irby DM, Cooke M, O'Brien, BC. 2010. Calls for the reform of medical education by the Carnegie Foundation for the advancement of teaching: 1910 and 2010. *Acad Med*. 85(2):220-227. doi: 10.1097/ACM.0b013e3181c88449.
<http://dx.doi.org/10.1097/ACM.0b013e3181c88449>

Klamen DL. 2015. Third Year Clerkships: Let's Get Real. *Acad Med*. In Press.

Lave J and Wenger E. 2003. *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press, Cambridge, UK.

Levine, AB. 2012. The importance of being coached. *Financial Management. Technical Notes*. July:50-53.

McGuffin, AA. and Obonyo, E. 2009. Enhancing performance: a case study of the effects of employee coaching in construction practice. *Construction Management and Economics*. 28:141-149. doi: 10.1080/01446190903460672
<http://dx.doi.org/10.1080/01446190903460672>

Morse JM. 1995. The significance of saturation. *Qual Health Res* 5:147-9. doi: 10.1177/104973239500500201
<http://dx.doi.org/10.1177/104973239500500201>

Muir, R. 2009. High performance coaching for low performing times. *Law People*.
(<http://www.lawpeopleblog.com/2009/01/high-performance-coaching-for-low-performing-times/>) Accessed May 29, 2014.

Nasca, T, Philibert I, Brigham T, Flynn T. 2012. The Next GME Accreditation System, Rationale & Benefits. *N Engl J Med*. 366(11): 1051-1056. doi: 10.1056/NEJMSr1200117
<http://dx.doi.org/10.1056/NEJMSr1200117>

Schrand T, Eliason J. 2012. Feedback practices and signature pedagogies: what can the liberal arts learn from the design critique? *Teach Higher Educ* 17(1):51-62.
<http://dx.doi.org/10.1080/13562517.2011.590977>

Showers, B and Joyce, B. 1996. The evolution of peer coaching. *Educational Leadership*. 53(6):12(5).

Shulman LS. 2005. Pedagogies of uncertainty. *Liberal Educ* 91(2):18-25.

Task Force on Academic Health Centers. 2002. Training Tomorrow's Doctors. The Medical Education Mission of Academic Health Centers. A Report of the Commonwealth Fund, New York, USA.

Watling C, Driessen E, van der Vleuten CPM, Lingard L. 2014. Learning culture and feedback: an international study of medical athletes and musicians. *Med Ed* 48:713-723. doi: 10.1111/medu.12407
<http://dx.doi.org/10.1111/medu.12407>

Watling C, Driessen, van der Vleuten CPM, Vanstone M, Lingard L. 2013. Beyond individualism: professional culture and its influence on feedback. *Med Ed* 47(6):585-594. doi: 10.1111/medu.12150
<http://dx.doi.org/10.1111/medu.12150>

Watling CJ, Lingard L. 2012. Grounded theory in medical education research: AMEE Guide No. 70. *Med Teach* 34(10):850-61. doi: 10.3109/0142159X.2012.704439.
<http://dx.doi.org/10.3109/0142159X.2012.704439>

Williams RG, Klamen DL, Hoffman RM. 2008. Medical student acquisition of clinical working knowledge. *Teach Learn Med*. 20(1):5-10. doi: 10.1080/10401330701542552.
<http://dx.doi.org/10.1080/10401330701542552>

Williams RG, Klamen DL, White CB, Petrusa E, Fincher RE, Whitfield CF, Shatzer JH, McCarty T, Miller BM. 2011. Tracking development of clinical reasoning ability across five medical schools using a progress test. *Acad Med* 86(9):1148-1154. doi: 10.1097/ACM.0b013e31822631b3.
<http://dx.doi.org/10.1097/ACM.0b013e31822631b3>

Figure 1: Network of coded field notes from 3rd & 4th year medical students characterizing prior coaching experiences.

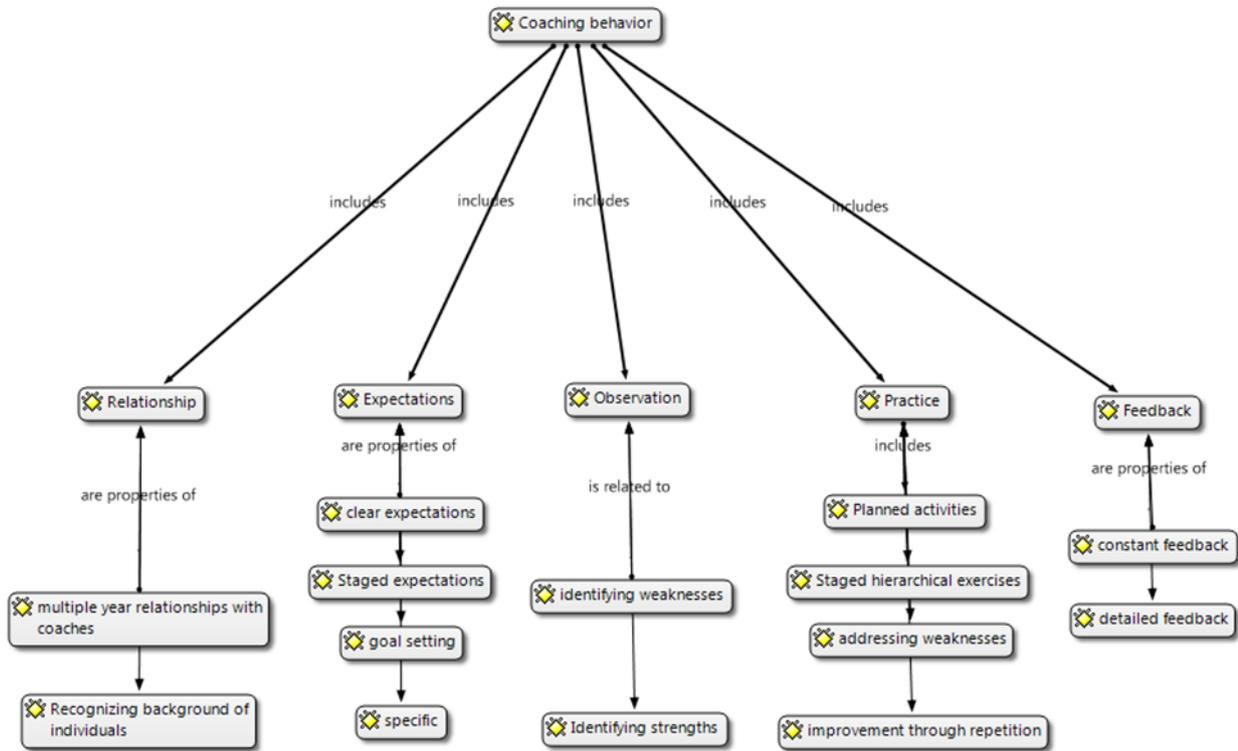


Figure 2: Network of coded field notes from 3rd & 4th year medical students characterizing third-year clerkships.

