



Cohort Study

Outstanding qualities of a successful role model in medical education: Students and professors' points of view

Soleiman Ahmady^a, Noushin Kohan^{b,*}, Hamidreza Namazi^c, Afagh Zarei^d,
Zohre Sadat Mirmoghtadaei^a, Hadi Hamidi^e

^a School of Management and Medical Education, Shahid Beheshti University of Medical Sciences, Tehran, Iran

^b Department of Medical Education, Smart University of Medical Sciences, Tehran, Iran

^c Ethics and History of Medicine Research Center, Tehran University of Medical Sciences, Tehran, Iran

^d Department of Medical Education, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran

^e Department of English Language, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran



ARTICLE INFO

Keywords:

Role modeling
Professionalism
Clinical teacher
Clinical setting

ABSTRACT

Introduction: Role models play a crucial role in determining the professional development of medical trainees. The purpose of this study was to gain in-depth understanding of the outstanding qualities of successful role models.

Material and methods: In this qualitative-descriptive study, data were collected through conducting interviews, and the inductive content analysis was performed. The study was done at the school of medicine of Tehran University of Medical Sciences in Iran. Twenty-five medical students, medical graduates, and faculty members participated in 25 interviews from April to December 2019. The participants were recruited via purposive sampling.

Results: five categories and 13 subcategories were extracted from the data. The results of this study illustrated five crucial qualities of a good clinical role model including an excellent character, effective coach and mentor, inspiring medical leader, expert clinical teacher, and a professional physician. Our results also highlighted the lasting effects of positive role modeling of clinical teachers on medical trainees' professional careers. Another category in the present study was connected to future consequences of being a role model in a clinical setting.

Conclusion: The result of this study illustrated crucial qualities of a good medical role model. This result can assist the leaders to engage with medical educators to better understand the process of role modeling and design the best plan for development of role modeling in medical education.

1. Introduction

Role Modeling is an important phenomenon in professional development [1]. Which is defined as a "purposeful activity that demonstrates the knowledge, skill, attitude and ethical behavior that students should acquire." It is a powerful teaching method suitable for medical apprenticeship setting in which students have the opportunity to observe their teachers in action and their effective behaviors [2]. According to Bandura, a theory driver in social psychology, a role model is an "individual admired for their ways of being and acting as a professional" who has a crucial role in teaching students the professional expertise and roles [3]. In medical education, a systematic review identified role modeling as one of the best approaches for cultivating

professionalism in medical students [4]. Role modeling of positive or negative behavior by physicians is an essential component of clinical teaching [5] which happens all over the curriculum including formal, informal, and hidden, in under-graduation and post-graduation stages [2]. In this regard, the majority of medical students in a study believed that observing the role models was more effective in their learning than formal teaching [6]. For effectiveness, role models need to be competent in clinical, personal, and skills. Therefore, role modeling is a combination of individual characteristics (Heart) and professional patient care (Hands-on), making the implicit explicit in teaching medicine (Head) [7]. Generally, role models do not resemble mentors since they are described as individuals who can inspire a sense of mission and teach by example [8] and may take place with or without the instructor's

* Corresponding author. Department of Medical Education, Smart University of Medical Sciences, Sarafraz Street, Shaheed Beheshti Avenue, Tehran, Iran.
E-mail address: Nu.kohan@gmail.com (N. Kohan).

<https://doi.org/10.1016/j.amsu.2022.104652>

Received 1 July 2022; Received in revised form 5 September 2022; Accepted 10 September 2022

Available online 20 September 2022

2049-0801/© 2022 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

awareness [9]. On the other hand, mentors are known to establish a formal communication with the students [8]. In a study, 90% of medical graduates remembered their role models who formed their professional attitude [10]. Given the significance of role modeling in professional identity development, it has been considered a key element in medical education reform [11] and an interested topic in medical education research.

In a BEME review on doctors' role modeling in medical education, six main categories of them were extracted [12]. After announcement of this study for future research to identify the phenomenon of role modeling [12], Passi and Johnson investigated and recognized the substantial outcomes [13]. In addition, Horsburgh identified strategies that clinical teachers and students teach and learn throughout role modeling [14].

In summary, the previous studies mainly emphasized the content which students learn from role models, the characteristics of a positive doctor role model, and investigation of the doctors' role modeling as a phenomenon like the one Pessi et al. (2013, 2016) did in their studies. In spite of these efforts in previous studies, it is unclear whether or not a doctor's role model is the same as a clinical teacher's role model. We supposed that there might be different. Therefore, this qualitative study was designed to answer the following question: "What are the qualities of a successful medical teacher's role model from the perspective of medical students, medical graduates, and medical educators?".

2. Material and Methods

In this qualitative study, inductive content analysis was performed, and the data were collected through conducting interviews.

2.1. Setting

The study setting was the School of Medicine at Tehran University of Medical Sciences (TUMS), which holds comprehensive medical programs, including residency (specialty and subspecialty), fellowship, and MD programs. Moreover, it holds different graduate programs in basic sciences (MSc, MPH, and PhD). Totally, 2460 medical students, 1963 specialty and 316 sub-specialty residents are studying at this university. Furthermore, 99 basic science teachers and 884 clinical teachers are teaching these students and residents in affiliated hospital. Generally, faculty members at this university are known as prominent clinicians and scholars not only for didactic training but also for role-modeling, transfer of clinical skills, and research mentoring. The TUMS' School of Medicine, as the oldest and the most famous medical school in Iran, is committed to research excellence, ethics, and provision of clinical services, especially in demanding clinical settings.

2.2. Recruitment process

We invited 25 participants to this study from April to December 2019. First of all, we provided a list of three categories of people who dealt with known role models. These three categories included medical students, medical graduates who had exposure to known role models during their clinical education, and finally the faculty members who worked as colleagues with the known role models. These people were selected from different hospitals affiliated to TUMS. The participants were recruited via purposive sampling for semi-structured interviews. We invited people to participate in this study from April to December 2019. Since the saturation of the data must be taken into account for the sufficiency of the qualitative data, the participants were invited from the list of selected people one after another until we reached no new data in the interview. All participants were invited by E-mails through which they were briefed on the purpose of the study. All of the candidates accepted to participate in the study, but the final appointment was based on the individuals' agreement on a specific date and time. The participants were recruited from TUMS.

2.3. Data collection

Semi-structured interviews were conducted in a separate and calm room in order to allow the participants to describe their experiences freely. The interviews started with a general question about the individuals' perception of a role model, especially in clinical teaching. Some probing questions such as "How do you define a great role model?" were also asked. The probing questions were based on the participants' answers to the general questions. The participants were encouraged to provide more explanations about the issues. Each interview lasted between 35 and 65 min which was recorded using a tape recorder and was immediately transcribed and analyzed. Data collection continued until the data were saturated after 25 interviews.

2.4. Data analysis

Qualitative content analysis, which provides valuable information about people's experiences and perceptions of a phenomenon, was performed to collect the data. We used inductive content analysis as defined by Elo and Kyngas (2008) for data analysis [15]. After making an agreement with the research group, the audio-taped interviews were transcribed and the transcripts were analyzed by two of the authors of this manuscript. This process briefly included the following two stages: selection of the analysis unit and understanding the data in the preparation phase, and open coding formation of categories, and abstraction in the organization phase. Themes and categories were extracted from the transcribed texts via inductive content analysis without considering previous theoretical framework. Peer-checking was conducted in the data analysis phase by two peers for ensuring the credibility and trustworthiness of the data. The results were assessed for credibility, transferability, dependability, and confirmability according to Lincoln and Guba [16] following these considerations: having prolonged engagement, immersion in data, transcription of the interview at the earliest time, student confirmation, consensus of team members on the extracted themes, collecting colleagues' opinions and recoding, as well as detailed description of the study steps.

2.5. Ethical considerations

All of the participants were given information about the aims of the study. In addition, participants could withdraw from the study at any time. Written consents were also obtained. Moreover, permission was obtained for recording the interviews, and confidentiality was maintained at all the stages of data collection and analysis.

3. Results

The study sample included 8 (32%) women and 17 (68%) men. Eight participants were medical faculty members, seven were medical graduates, and ten were medical students consisting of five interns and five clerks. The participants' age ranged from 23 to 68 years (45.5 years average). The average year the invited faculty members worked was 17, and the average year of practice for graduates was 7 years. Five categories and 11 sub-categories were extracted from qualitative content analysis.

3.1. Excellent character

From the participants' perspective, role models have some characteristics which make them an excellent person. Characteristics like being patient, humble, kind, caring, honest, truthful, showing empathy, and having effective interactions.

"For example, Dr. X has never boasted about his knowledge. He was exemplary in his humility. He was very kind to the students, and at the same time, he was very serious about his work."

“All the people who were associated with Prof. X remembered his calmness, humility, and dignity. He believed that if we want to succeed in life, we should set aside our pride. By avoiding our instincts, we will be ready to rise up, learn, and evolve.”

3.2. Effective coach and mentor

For being a good coach and mentor, clinical teachers should attempt to be a perfect nurturer, facilitator, encourager, and advisor for the students.

“Prof ... was glad to see we could educate the next generation as distinguished future physicians.”

“Whenever I had a medical question, I asked him.”

“In addition to teaching medical sciences, he taught us to practice medicine. What he taught us was about life and ethics. By providing examples, he tried to teach us how to practice medicine.”

3.3. Inspiring medical leader

The participants highlighted the significance of a role model's inspiring behavior which can turn them into a medical and educational leader. The clinical teachers who were recognized as role models enabled us to form a community, support the academic community, and create effective changes.

“He emphasized the establishment of an ethical relationship between physicians for having a healthy, coherent, and active medical community.”

“He believed role models should strongly support the university administrators and officials.”

“A role model could be a leader of change in every field. We saw whenever the university was going to make a difference, it hired professor”

3.4. Expert clinical teacher

In a clinical setting, a role model should be able to teach students effectively while observing considerations of patient care.

“A role model should treat patients with respect and kindness.”

“A role model always gives the right to the patients.”

“Dr ... could remember all his patients.”

“A role model always supports the patients.”

“A role model should speak fondly, entertain audience, and keep them engaged. He/she should possess a special clinical vision.”

“He knew how to attract the students' attention and win their hearts. Many professors have a high level of knowledge, but their words have no power. Prof ... was a great example in this respect.”

3.5. Professional physician

Participants emphasized that for the role of a physician, a role model has to conduct professionally. In addition, he/she should have professional knowledge.

“A role model should put himself/herself in patients' shoes and understand their concerns.”

“A role model should provide honest care for patients and be competent in his/her job.”

“A role model should produce great work in medicine and ethics.”

“A role model must also have sufficient knowledge of the relationship between people and different ethnicities to be able to make a correct diagnosis.”

4. Discussion

This study was performed with the aim of finding the characteristics of clinical teacher role models. The orientation to that will help instruct role modeling, develop faculties, and use them in clinical settings. The findings of present study showed that a medical teacher role model can have five character types, including an excellent personal character, effective coach abilities, inspiring medical leadership, expert clinical teacher, and professional physician; these lead to some positive roles in clinical education.

4.1. Excellent character

Having an excellent character for being a role model, such as kindness, empathy, patience, honesty, truthfulness, and caring for others is important. Physician effectiveness is a conclusion of various personal characteristics, their history, family and background, values, and attitudes [17]. Elzubeir (2001) identified the role model characteristics in the viewpoint of medical students, interns, and residents which were categorized in three main types including personality, teaching, and clinical skills. According to Elzubeir, the most repetitive aspect of the role models are their personality characteristics such as having positive, respectful attitudes toward patients and their families as well as staff and colleagues, honesty, politeness, enthusiasm, competence, and knowledge [18].

4.2. Effective coaches and mentors

Although Racer (1998) made a difference between a mentor and a role model due to existing a formal communication between mentors and mentees [8], the results of this study showed that mentoring is used for guiding and facilitating the planning for learners' success and educational growth; this could be a part of role modeling. Fowler and O'Gorman (2019) introduced eight categories of mentoring function: learning facilitation, coaching, personal and emotional guidance, facilitation of career development, advocacy, strategies and systems advice, role modeling, and friendship [19] which confirm the overlapping of the two “mentor” and “role model” concepts.

The main domains of most mentoring functions are based on the Kram Mentoring Theory, which recognized two mentoring function categories: career-related function and psychosocial function. Psychosocial functions, which develop self-confidence and self-esteem, include counseling, friendship, and role modeling. The career-related function includes exposure, protection, and sponsorship [20]. The present findings are consistent with previous research which showed that by having positive role models as mentors, medical students can develop their skills including professional attitudes and behavior, and also develop their identity as a physician [21].

4.3. Inspiring medical leaders

The findings of this study showed a role model is a person who is respected by other people and whose behavior and successes are copied. A study by Huang et al. (2014) revealed that in the Leader-Member Exchange Theory, leaders are aware of their reputation and work to maintain a positive one in line with the organizational values. They also develop strong relationships with their followers and thus invest in them. These relationships provide an opportunity for leaders to intentionally act as role models. By communicating with other people and continuing their cooperation, leaders help others in order to assist

themselves [22].

According to a study by Saxena (2014), transformational leaders are unique and flexible, risk taker, and tolerant of uncertainty. They are passionate and inspirational, using their influence to act as role models. In addition to their inspirational role, they show expertise in some technical skills, which can involve people and/or leadership [23]. Chan (2019) believed that leaders, with both expert knowledge and unique access, are accepted as experts in professional settings. They develop supportive relationships that benefit others because they are willing to lend expertise, access, time, and energy, providing both professional and psychosocial support for others [24].

4.4. Expert clinical teachers

The clinical teacher, supervising the student in clinical practice, becomes a role model for students. Therefore, the teacher's professional behavior can have a positive effect on students, whereas unprofessional behavior may have negative effects. In a systematic review of the literature on attributes of a clinical trainer as a role model, various lists of attributes have been proposed to describe clinical role models. These attributes can be classified into teaching qualities, patient care qualities, and personal qualities. A good clinical trainer needs to be conscious of his/her function as a role model since development of clinical training skills may be supported by increased awareness of role modeling behavior [7]. Students in a study by Burgess (2015) highlighted the excellence in teaching skills, understanding of the curriculum, and the ability to meet the students' needs [25]. Several researchers [26] believe that a clinical teacher as a role model should make his/her behavior explicit to the pupils in order to increase their attention and motivate them. Hafferty and Franks (1994) suggested those who work with students need to know themselves as ethical agents and role models. The not only need to conduct ethically, but need to share and discuss the ethical problems to students [27] and practice reflectively. All practitioners have to make students to reflect too [27].

4.5. Professional physician

A clinical teacher is primarily a physician. Clinical education happens in the presence of a patient. As a physician, a clinical teacher needs to know the medical knowledge to manage the patients as well as the professional conduct to deal with patients, students, colleagues [12]. Some studies suggested the patient-centered approach in a role model practice [25]. The clinical education is not only the acquisition of medical knowledge and skills, but is the acquisition of physician identity. Medical education is "a process of moral enculturation" [27].

Doctor-patient relationship which is the ethical core of medicine is mostly taught via role modeling. According to Egnaw (2011), doctors who share their doctoring experience with students transparently are more successful in teaching communication to students [28]. Although there are some overlapping between professional physician categories with expert clinical teacher category, the former emphasizes patient care more, while the latter focuses on instruction aspects.

These results highlighted the lasting effects of positive role modeling on medical trainees' professional careers. The role models are the most powerful figures in the formation of professional characters. The role models affect the development of professionalism. Positive doctor role models influence the behavior of medical students by demonstrating to them how to act professionally with patients and clinical staff. Positive role models also help medical students cultivate their own professional role in medical practice and influence career choices [13]. Yoon (2018) also showed in his longitudinal study the effects of a role model to choose residency training in that role model's specialty [29]. The professionals highlighted that role modeling is vital because many professional characteristics such as integrity are challenging to teach [13]. Consequently, the role models are persistent in mind of medical graduates; they are coaches and mentors, expert clinical teachers, inspiring

medical leaders, and finally professional physicians. Clinical teacher role models provide support, protection, reflectiveness, advice, approval, confirmation, and coaching to their medical graduates and can have a great influence on students' awareness of the excellence of their medical education experience. Considering the significance of role modeling, there is a significant need for positive role models in medical training, especially clinical teacher role models with the intention of practicing as a clinical teacher.

The previous studies showed that mostly the concept of doctor role modeling was focused on the literature [12,13]. In the present study, we investigated the clinical teacher role modeling assuming that the two concepts are different. Although some aspects of the clinical teacher role models or characteristics of a clinical teacher [30] have been addressed in these studies, the clinical teacher role modeling has not been specifically studied so far. As presented in this study, in addition to personal quality, meeting a high standard clinical care and demonstrating teaching skills which were emphasized in doctor role modeling in clinical teaching [14], other qualities such as "effective coach and mentor" and "inspiring medical leader" were found. In other words, these qualities differentiate our study from previous studies.

Our study has a few limitations. Firstly, we only focused on one faculty of the university (School of Medicine); this may limit the generalizability of the findings to a wider population. Further studies of role modeling from other medical schools are needed to report the qualities of successful role models in the field of medicine. Secondly, our study was based on qualitative data. There is no doubt that combining quantitative with qualitative data can help improve the robustness of findings. Therefore, it is recommended that researchers conduct quantitative studies to explore hidden characteristics of successful role models.

5. Conclusion

The result of this study illustrated crucial qualities of a good medical role model. This result can assist leaders to engage in medical educators to better understand the process of role modeling and design the best plan for the development of role modeling in medical education. These findings will be the key points in assisting leaders in medical education to better appreciate the way in which positive clinical role modeling can be incorporated into medical education.

Ethical approval

All participants were informed about the aims of the study. In addition, the participants were informed that they could withdraw from the study at any time without any consequences. Written consent was obtained from all participants. Moreover, permission was obtained for recording interviews. Confidentiality was maintained through all steps of the data collection and analysis. The research proposal was submitted to the IRB committee. The committee reviewed the proposal and decided that there was no involvement of human or animal factors in the research, and hence there was no need for ethical approval.

Sources of funding

No source of funding

Author contribution

Study concept or design, data collection, data analysis or interpretation, writing the paper, others, who have contributed in other ways should be listed as contributors.

Registration of research studies

Name of the registry:

Unique Identifying number or registration ID-
Hyperlink to your specific registration (must be publicly accessible
and will be checked):

Guarantor

Dr Noushin Kohan, Department of Medical Education, Virtual University of Medical Sciences, Tehran, Iran.

Consent

=

Disclosure statement

The authors report no conflicts of interest. All authors approved the final manuscript.

Declaration of competing interest

No conflict of interest.

Acknowledgements

We would like to thank all the participants who contributed to this study through interviews.

References

- [1] V. Passi, N. Johnson, The impact of positive doctor role modeling', *Medical teacher*, Taylor & Francis 38 (11) (2016) 1139–1145.
- [2] D.M. Irby, Clinical teaching and the clinical teacher', *Academic Medicine*, LWW 61 (9) (1986) 35–45.
- [3] A. Bandura, D.C. McClelland, *Social Learning Theory*, Prentice Hall, Englewood cliffs, 1977.
- [4] H. Birden, et al., Teaching professionalism in medical education: a best evidence medical education (BEME) systematic review. BEME guide No. 25', *Medical teacher*, Taylor & Francis 35 (7) (2013) e1252–e1266.
- [5] L. Bazrafkan, et al., Clinical teachers as positive and negative role models: an explanatory sequential mixed method design, *J. Med. Ethics Hist. Med.* 12 (2019). Tehran University of Medical Sciences.
- [6] A.D. Glick, G.B. Merenstein, Addressing the hidden curriculum: understanding educator professionalism', *Medical teacher*, Taylor & Francis 29 (1) (2007) 54–57.
- [7] H.G.A.R. Jochemsen-van der Leeuw, N. van Dijk, M. Wieringa-de Waard, Assessment of the clinical trainer as a role model: a role model apperception tool (RoMAT)', *academic medicine*, Wolters Kluwer Health 89 (4) (2014) 671.
- [8] R.E. Ricer, Defining preceptor, mentor, and role model, *Fam. Med.* 30 (5) (1998) 328.
- [9] S.R. Cruess, R.L. Cruess, Y. Steinert, Role modelling—making the most of a powerful teaching strategy', *Bmj*, British Medical Journal Publishing Group 336 (7646) (2008) 718–721.
- [10] S. Wright, A. Wong, C. Newill, The impact of role models on medical students, *J. Gen. Intern. Med.* 12 (1) (1997) 53–56. Springer.
- [11] M.E.L. Brown, et al., Forging a new identity: a qualitative study exploring the experiences of UK-based physician associate students', *BMJ open*, British Medical Journal Publishing Group 10 (1) (2020).
- [12] V. Passi, et al., Doctor role modelling in medical education: BEME Guide No. 27', *Medical teacher*, Taylor & Francis 35 (9) (2013) e1422–e1436.
- [13] V. Passi, N. Johnson, The hidden process of positive doctor role modelling', *Medical teacher*, Taylor & Francis 38 (7) (2016) 700–707.
- [14] J. Horsburgh, K. Ippolito, A skill to be worked at: using social learning theory to explore the process of learning from role models in clinical settings', *BMC medical education*, BioMed Central 18 (1) (2018) 156.
- [15] S. Elo, H. Kyngäs, The qualitative content analysis process, *J. Adv. Nurs.* 62 (1) (2008) 107–115.
- [16] E.G. Guba, Y.S. Lincoln, 'Competing Paradigms in Qualitative Research', *Handbook of Qualitative Research*, 6 vol. 2, Sage Publications, California, 1994, pp. 105–117. Available at: http://create.alt.ed.nyu.edu/courses/3311/reading/10-guba_linco ln_94.pdf.
- [17] D.H. Novack, et al., Calibrating the physician: personal awareness and effective patient care, *Jama*. American Medical Association 278 (6) (1997) 502–509.
- [18] M.A.R.D.E. Elzubeir, Identifying characteristics that students, interns and residents look for in their role models, *Med. Educ.* 35 (3) (2001) 272–277.
- [19] J.L. Fowler, D.S. Fowler, J.G. O'Gorman, 'Worth the Investment? an Examination of the Organisational Outcomes of a Formal Structured Mentoring Program', *Asia Pacific Journal Of Human Resources*, Wiley Online Library, 2019.
- [20] D. Rogers, *A Correlational Study: E-Mentoring, Perceptions of E-Mentoring and the Actual Career Advancement of Women in Educational Leadership*, City University of Seattle, 2020.
- [21] T.J. Carter, et al., Building professional identities by learning from mentors and role models', *transformative Learning in Healthcare and helping professions education: building resilient professional identities*, IAP 111 (2019).
- [22] J. Huang, L. Wang, J. Xie, Leader-member exchange and organizational citizenship behavior: the roles of identification with leader and leader's reputation', *Social Behavior and Personality: an international journal*, Scientific Journal Publishers 42 (10) (2014) 1699–1711.
- [23] S. Saxena, Are transformational leaders creative and creative leaders transformational? An attempted synthesis through the big five factor model of personality lens, *Aweshkar Research Journal* 18 (2) (2014).
- [24] S.C.H. Chan, *Participative Leadership and Job Satisfaction*, Leadership & Organization Development Journal. Emerald Publishing Limited, 2019.
- [25] A. Burgess, K. Oates, K. Goulston, Role modelling in medical education: the importance of teaching skills, *The clinical teacher*. Wiley Online Library 13 (2) (2016) 134–137.
- [26] H.G.A.R. Jochemsen-van der Leeuw, et al., The attributes of the clinical trainer as a role model: a systematic review', *Academic Medicine*, LWW 88 (1) (2013) 26–34.
- [26] F.W. Hafferty, R. Franks, The Hidden Curriculum, Ethics Teaching, and the Structure of Medical Education, *Academic medicine*. Lippincott Williams & Wilkins, 1994.
- [27] L.P. Mileder, A. Schmidt, H.P. Dimai, 'Clinicians should be aware of their responsibilities as role models: a case report on the impact of poor role modeling', *Medical education online*, Taylor & Francis 19 (1) (2014), 23479.
- [28] T.R. Egnew, H.J. Wilson, Role modeling the doctor-patient relationship in the clinical curriculum, *Family Medicine-Kansas City* 43 (2) (2011) 99.
- [29] J.D. Yoon, et al., Role models' influence on specialty choice for residency training: a national longitudinal study, *Journal of graduate medical education* 10 (2) (2018) 149–154. The Accreditation Council for Graduate Medical Education.
- [30] K.N. Huggett, R. Warrier, A. Maio, Early learner perceptions of the attributes of effective preceptors, *Adv. Health Sci. Educ.* 13 (5) (2008) 649–658. Springer.