

What Makes a Good Clinical Teacher in Medicine? A Review of the Literature

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Abstract

Purpose

The authors perform a review of the literature pertinent to the question, "What makes a good clinical teacher in medicine?"

Method

After framing the question, based on discussions of their own experiences with clinical teachers, the authors performed a search of the literature pertinent to the question, "What are the qualities of a good clinical teacher in medicine?" Between July and December, 2006, they reviewed titles from *Index Medicus* (1909–1966), PubMed (1966 to the present), PubMed Related Articles, and referenced articles. The initial selections

were chosen by scanning pre-1966 *Index Medicus* title lists and post-1966 abstracts. Chosen articles were then read in their entirety, and those which described specific characteristics of clinical teachers were selected for inclusion. Qualitative analysis was used to identify themes.

Results

From 4,914 titles, 68 articles were selected for analysis—26 published before 1966, and 42 published after 1966. Four hundred eighty descriptors were identified and grouped into 49 themes, which were clustered into three main categories: physician, teacher, and human characteristics. Echoing the

authors' intuitive descriptions, noncognitive characteristics dominated the descriptions and themes.

Conclusions

Excellent clinical teaching, although multifactorial, transcends ordinary teaching and is characterized by inspiring, supporting, actively involving, and communicating with students. Faculty development programs and future research should focus on development of the noncognitive attributes of clinical teachers, as well as the knowledge and skills associated with effective teaching.

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In a multitude of counselors there is wisdom. We may remember but little of what they said, but we treasure the memory of what they were, for students see their teachers with a penetrating gaze. With the naïve assurance of youth we knew them, and their brightness is not tarnished by our present certainty that they were not always right in what they taught us or in their methods of teaching.

—Robert Marshall, 1955¹

The question, "What makes a good clinical teacher in medicine?" has been the subject of a considerable body of literature, ranging from essays to empirical studies, and still continues to generate passionate discussion.^{2,3} Medical education scholars have lamented the numerous threats faced by modern American education and the challenges of turning novices into "informed, curious, compassionate, and moral physician(s)."⁴

For example, Cooke and her colleagues⁴ identify as major threats (1) the emphasis of research over teaching, (2) the evolution of research and clinical care into distinct silos creating a dearth of gifted clinician—researchers to teach the students, and (3) economic pressures on faculty to spend more time involved in their clinical duties at the expense of teaching. The transformation of our students requires the engagement of innovative and outstanding clinician—teachers who not only supervise students in their development of technical skills and applied knowledge but also serve as role models of the values and attributes of the profession and of the life of a professional. In 1925, Abraham Flexner⁵ appealed for excellent clinical teachers, educators who were of "enlightened spirit, seeking stimulus and suggestion."

Medical schools have tended to let students decide who is a good or excellent teacher through surveys and student-voted teaching awards. All of us believe that there is such a thing as good and poor clinical teaching, even as we believe there are faculty who are good teachers and faculty who are not good teachers.⁶ But what makes a good clinical teacher in medicine? Only two reviews addressing

this question have been done, and both of them have focused entirely on teaching in ambulatory settings.^{7,8}

The answer to this question is important to the field of medical education and to every institution of medical education responsible for creating knowledgeable and compassionate doctors. Therefore, we decided to perform a systematic review of the literature grounded in various forms of inquiry, including the thoughtful essays written early in the 20th century, pertinent to the question, "What makes a good clinical teacher in medicine?"

Method

To build a conceptual framework and formulate our initial question,⁹ we (G.S. and R.S.) began by discussing our most influential clinical teachers in medicine and their most effective teaching characteristics. We identified five common themes in our descriptions; we referred to the first four as noncognitive and to the last one as cognitive. We defined "noncognitive" characteristics as those involving relationship skills, emotional states, and personality types, and "cognitive" characteristics as those involving perception, memory, judgment, reasoning, and procedural

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skills. We met to combine and further review our answers:

1. Relationships: A good teacher recognizes that the student–teacher relationship is an educational tool. Teaching becomes a bidirectional exchange. Students appreciate individual attention, and teachers have a role similar to that of a parent. Trust and individual consideration are paramount.
2. Emotional activation: A good teacher has the ability to excite, arouse, and activate his or her students. Although we have all experienced this enthusiasm and responded to it, for now we do not know how it is actually done.
3. Generativity: A good teacher understands that teaching is a giving process which changes as the student grows. The student is allowed a stepwise assumption of responsibility and is given permission to make independent decisions or to perform technical steps of a procedure only when he or she is almost ready. The teacher may be challenging. Expectations may be high.
4. Self-awareness: A good teacher reflects on his or her teaching and is sensitive to feedback. This quality may allow good teachers to adjust quickly to the characteristics of individual students and student groups.
5. Competence: A good teacher is a master of what he or she is trying to teach, and, probably, the student identifies selectively with ways in which the teacher models the doctor–patient relationship.

With this framework in mind, two of us (G.S. and R.S.) independently performed a PubMed search from 1966 to the present, using the terms *teaching*, *medical education*, and *medical faculty*. We found additional relevant articles using the Related Articles function in PubMed and by reviewing referenced articles. We obtained articles published before 1966 by scanning titles listed in *Index Medicus* under the subheading *Medical Education*, selecting those titles that seemed relevant to our search, pulling these articles, and reading them in their entirety to determine whether they merited inclusion.

At each stage of the selection process, we (G.S. and R.S.) selected only those articles relevant to the question, “What specific characteristics make a good clinical teacher in medicine?” We defined *clinical*

teaching in medicine using Stritter and Baker’s¹⁰ 1982 definition: “the teaching/learning interaction between instructor (attending physician) and student (resident) that normally occurs in the proximity of a patient and focuses on either the patient or a clinical phenomenon that concerns a patient or a class of patients.” Articles were selected only if they included specific characteristics.

Our initial PubMed search and *Index Medicus* review generated 4,914 relevant titles, 4,060 published before 1966 and 854 published during or after 1966 (Figure 1). With Stritter and Baker’s¹⁰ definition of *clinical teaching in medicine* in mind, we reviewed these titles, culling 153 published before 1966 and 161 published during or after 1966 that included specific teaching characteristics

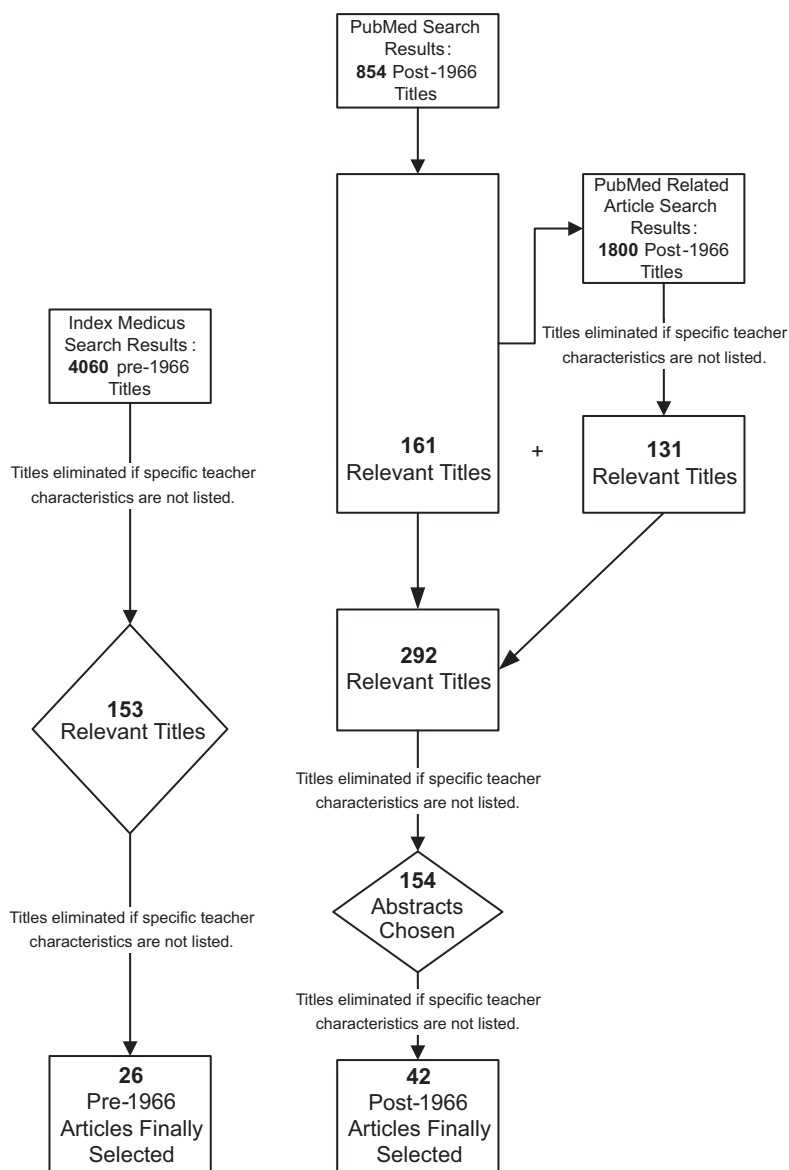


Figure 1 Overview of the 2006 selection of articles from the literature framed on the question, “What makes a good clinical teacher?” The initial *Index Medicus* scan of titles generated 4,060 published prior to 1966, which was winnowed to 153 relevant titles. Abstracts were not available. After reading all 153 articles, the authors ultimately selected 26. Similarly, the initial PubMed search generated 854 titles of articles published after 1966, which was winnowed to 161 relevant ones. The authors then performed a PubMed “Related Articles” search and a review of referenced articles on these 161 titles, yielding an additional (approximately) 1,800 unique post-1966 titles, which they then reviewed and reduced to 131, for a total of 292 post-1966 titles. The authors printed abstracts for all 292 post-1966 titles and further winnowed them to 154. After reading all 154 articles, they ultimately selected 42.

relevant to our initial question, “What specific characteristics make a good clinical teacher in medicine?” We then performed a PubMed Related Articles search and a review of referenced articles on these 161 titles, yielding an additional (approximately) 1,800 unique 1966 or later titles, which we then reviewed and reduced to 131 (eliminating publications that did not specifically describe teacher characteristics), for a total of 292 post-1966 titles. We printed abstracts for each post-1966 title (abstracts were not available for pre-1966 titles). We then reviewed these 292 abstracts and further winnowed them to 154, on the basis of their pertinence to our specific question. We photocopied full articles for the 153 pre-1966 articles and the 154 post-1966 articles, reviewed these articles, and made our final selections, resulting in a total of 68 articles, 26 published before 1966 and 42 published after 1966. We chose abstracts and articles only if they listed specific characteristics of good medical teachers. These characteristics were usually based on either the results of a survey of students/residents or the values or practical wisdom of the author(s). We (G.S. and R.S.) settled disagreements about inclusion by discussion and coming to a consensus. See Figure 2 for a detailed description of the numbers that “overlapped,” or were chosen simultaneously by each author at each stage of the article-selection process.

We (G.S., E.W., I.H., and R.S.) then independently reviewed these 68 articles with the purpose of identifying themes or patterns in descriptions of characteristics of a good medical teacher, using the method of constant comparative analysis.⁹ Through discussion, we reached a consensus on clustering all themes into larger categories of characteristics: physician characteristics, teacher characteristics, and human characteristics. We subsequently labeled all themes as cognitive or noncognitive, using the definitions created in our initial framing.

We combined themes whenever possible to create a more concise list, but no themes were outright excluded. For example, we clustered *spends time explaining, allows sufficient time for discussion, extensive involvement with students*, and *accessible* into one theme titled *Accessible/available to students*. Our final list of themes (Appendix 1) contained only positive descriptions

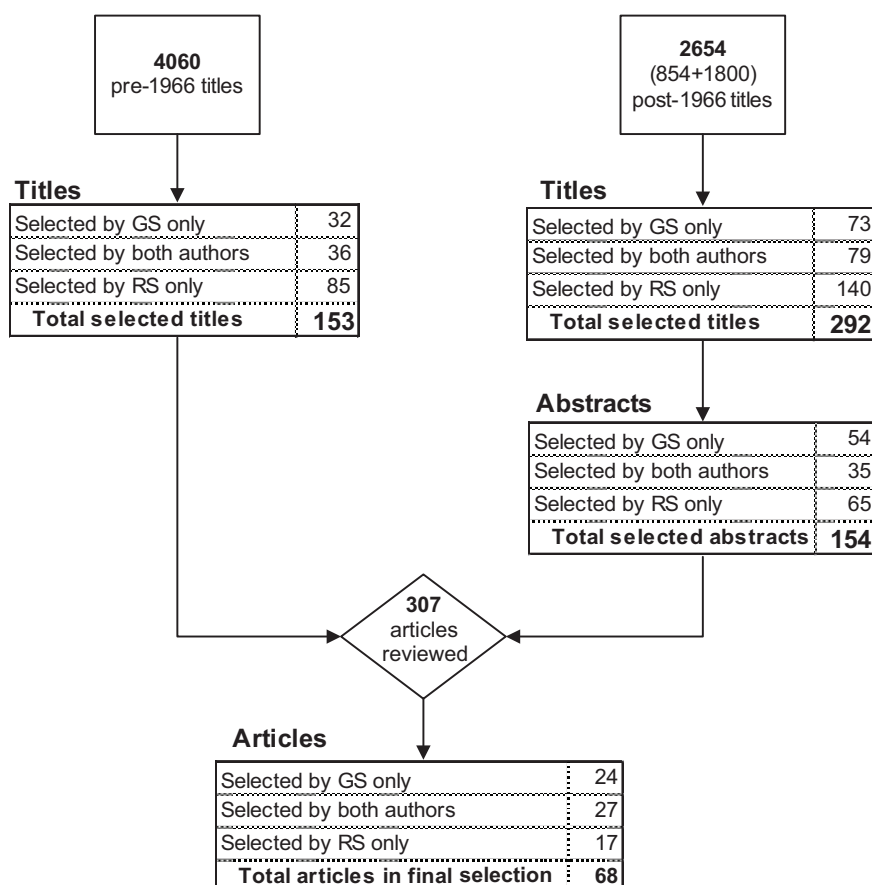


Figure 2 Comparison of selections by two authors (GS and RS) for the 2006 review of literature framed around the question, “What makes a good clinical teacher?” Although each of the two authors reviewed the titles, abstracts, and articles independently, some selections overlapped or were chosen by both while others were chosen by only one or the other.

because our purpose was to identify criteria for good clinical teaching in medicine. When an article provided a negative description with respect to a criterion, we included it in our analysis and results, but without specifying that it provided a negative opinion about teachers with respect to that criterion. For example, *judgmental* was translated to *nonjudgmental* and included within *Considers others’ perspectives, viewpoints*.

Results

Characteristics of the studies analyzed

The 68 articles identified in our literature search included 26 published before 1966 and 42 published after 1966 (Table 1). Many of these¹¹ reported results of surveys of students, residents, or colleagues, or they¹² were essays about the characteristics of the ideal clinical teacher. With one exception,¹¹ the pre-1973 articles were all essays, many of which were transcriptions of addresses given to medical societies.

The post-1973 articles incorporated a wide array of methodologies, including surveys, interviews, and observations of faculty teaching. In those articles, survey results for structured questions were analyzed using descriptive statistics, and the results for open-ended questions were analyzed using qualitative data-analysis methods (Table 1). One article reported correlations between student and faculty opinions of good teaching.¹² Three of the 68 articles reported correlations between student opinions about their clinical teachers and student performance.^{13–15}

Sixty-five articles described positive attributes, and three^{16–18} described negative attributes. All but seven of the essays were written about studies performed primarily within the United States or Canada.^{*19–22,29,32,77} We were unable to obtain references from before 1909.

* Due to additions made in the proof stage, references 29, 32, and 77 are cited out of order.

Table 1

Literature Review: What Makes a Good Clinical Teacher in Medicine?

Lead author	Year	Form of inquiry/scholarship (constituents who provided raw data)	University*
Eliot ⁴⁴	1909	Essay	Harvard University
Hall ⁴⁵	1912	Essay	Clark University
Smith ⁴⁶	1924	Essay	Beaver Country Day School
Meakins ⁴⁷	1928	Essay	McGill University
Barker ⁴⁸	1929	Address	Southern Medical Association (SMA) 22nd Annual Meeting, Asheville, NC
Cecil ²⁵	1929	Essay	
Musser ⁴⁹	1929	Essay	Tulane University School of Medicine (SOM)
Whitehead ⁵⁰	1929	Essay	Harvard University
Reid ²⁶	1932	Essay/review of notable essays	Boston
Blackburn ⁵¹	1934	Address	University of Sydney
Oppenheimer ¹¹	1934	Survey (faculty): Qualitative analysis	Emory University SOM
Lettenberger ⁵²	1938	Essay	Marquette University
Cheever ⁵³	1940	Essay	Harvard Medical School
Finney ⁵⁴	1941	Essay	Chairman's Address SMA 34th Annual Meeting, Louisville, KY
Capon ⁵⁵	1945	Essay	President's Address
Ackernacht ⁵⁶	1947	Address	
Walshe ⁵⁷	1947	Essay	University College Hospital
Tresidder ⁵⁸	1948	Essay	Stanford University
Slobody ⁹	1950	Essay	New York Medical College
Randall ⁵⁹	1953	Essay	
Marshall ¹	1955	Address	
Welt ⁶⁰	1955	Essay	University North Carolina SOM
Schindler-Raiman ²⁷	1960	Essay	University of California
Trimble ⁶¹	1960	Essay	Unknown
Spalding ²⁴	1963	Essay	Columbia University
Seegal ⁶²	1964	Essay	Columbia University
Wessels ¹⁹	1973	Essay	University Witwatersrand, Johannesburg
Irby ⁶³	1977	Survey and interviews (students): Qualitative analysis	University of Washington SOM
Petzel ¹³	1978	Correlation study (students)	University of Minnesota
Weinreb ⁶⁴	1981	Observation (residents): Qualitative analysis	Milton S. Hershey Medical Center
Gjerde ⁶⁵	1982	Survey (residents): Ratings/rankings	University of Iowa
Greganti ²³	1982	Essay	University of North Carolina SOM
Wolverton ⁶⁶	1985	Survey (residents): Ratings/rankings	St. Elizabeth Medical Center
Irby ¹⁶	1986	Essay	University of Washington SOM
Irby ⁶⁷	1987	Quantitative analysis of clinical teacher ratings (students)	University of Washington SOM
Ficklin ⁶⁸	1988	Synopsis of conference discussions (faculty, community physicians, residents, students)	Indiana University SOM
Hilliard ⁶⁹	1990	Survey (residents, fellows, faculty): Ratings/rankings	University of Toronto
Anderson ¹⁴	1991	Performance outcome study (students)	University of Minnesota
Irby ⁷⁰	1991	Survey (students, residents): Ratings/rankings	University of Washington SOM
Stritter ⁷¹	1991	Survey (faculty): Ratings/rankings	University of North Carolina
Kendrick ⁷²	1993	Survey (residents): Ratings/rankings	Wake Forest University

(Table Continues)

Table 1

(Continued)

Lead author	Year	Form of inquiry/scholarship (constituents who provided raw data)	University*
Irby ⁷³	1994	Interviews and observations (faculty): Qualitative analysis	University Washington SOM
Ullian ³³	1994	Survey (residents): Qualitative analysis	Baylor College of Medicine
White ⁷⁴	1995	Interviews (residents, faculty): Qualitative analysis	Loyola Marymount University
Hekelman ⁷⁵	1996	Essay	Case Western Reserve University
Wright ³⁴	1996	Survey (residents): Ratings/rankings	McGill University
Ambrozy ¹²	1997	Survey (faculty): Ratings/rankings	University of Washington, University of North Carolina
Wright ³⁵	1997	Survey (students): Ratings/rankings	McGill University
Beaudoin ¹⁷	1998	Survey (students): Ratings/rankings	Laval University, University of Montreal, University of Sherbrooke
Pinsky ²⁸	1998	Survey and interviews (faculty): Qualitative analysis	University of Washington SOM
Wright ⁷⁶	1998	Survey (residents): Case-control analysis	Johns Hopkins University
General Medical Council ⁷⁷	1999	Teaching guidelines	United Kingdom
Boendermaker ³²	2000	Focus groups (faculty): Qualitative analysis	University of Groningen, Netherlands
Cote ¹⁸	2000	Interviews (faculty): Qualitative analysis	Laval University Faculty of Medicine
Kernan ⁷⁸	2000	Survey (students): Ratings/rankings	Yale, Tufts, University of Massachusetts
Paukert ³⁶	2000	Survey (students): Qualitative analysis	Baylor COM
Elzubeir ²⁰	2001	Survey (students, residents): Ratings/rankings	United Arab Emirates
Irby ³⁰	2001	Essay/review of notable studies	University of California SOM
Markert ³¹	2001	Essay	Creighton University SOM
Roop ¹⁵	2001	Correlation study (students)	Walter Reed Army Medical Center
Cox ⁷⁹	2002	Survey (residents): Ratings/rankings	East Carolina University
Boendermaker ²⁹	2003	Survey (faculty): Qualitative analysis	University of Groningen, Netherlands
Elnicki ⁸⁰	2003	Survey (students): Ratings/rankings	University of Pittsburgh
Ker ²¹	2003	Survey (faculty): Qualitative analysis	University of Dundee, Scotland
Buchel ⁸¹	2005	Survey (residents, faculty): Ratings/rankings	Mayo Clinic, Scottsdale, Ariz
Morrison ⁸²	2005	Survey (international sample of faculty and resident teachers): Ratings/rankings	
Torre ⁸³	2005	Observation (students): Quantitative analysis	Medical College of Wisconsin
Molodysky ²²	2006	Essay	University of Sydney

* The university listed in an essay is the home university of the main author. If a survey was conducted, the university or universities listed is where the survey was conducted.

Common themes discovered in the studies analyzed

In our review of the 68 selected articles, we identified 480 descriptions of characteristics of a good clinical teacher, and from an all-inclusive list of these characteristics, we identified 49 themes which we clustered into three larger categories of clinical teaching characteristics: physician characteristics, teacher characteristics, and human characteristics (Appendix 1). Out of the 49 themes and 480 descriptions of good clinical teaching, 33 (67%) of these themes

and 301 (63%) of these descriptions were classified as noncognitive. Sixteen themes (33%) and 162 descriptions (34%) were described as cognitive. Seventeen descriptions (3%) could not be classified into any specific theme. These were classified as *other*. We included described characteristics from all 68 studies, regardless of study design or quality.

The most commonly reported themes, with the number of citations and an illustrative quotation, are presented below.

Medical/clinical knowledge

(30 citations). “The provision of biomedical information is often considered both necessary and sufficient to make rounds educationally productive and to improve the clinical skills of the ward team.”²³

Clinical and technical skills/competence, clinical reasoning

(28 citations). “The proficient doctor must be able to do certain procedures and the good teacher knows that the

teaching of such simple skills as lumbar puncture, or catheterization, is important.”¹⁹

Positive relationships with students and supportive learning environment (27 citations).

“A favorable atmosphere influences learning. This refers not only to the physical environment and the methods used but also to the teacher’s personality and the general climate of the institution.”²⁴

Communication skills (21 citations).

“Excellent listening and speaking skills allow clinical teachers to encourage active participation, establish rapport, answer questions carefully and precisely, and question students in a nonthreatening manner.”²²

Enthusiasm. We identified three separate themes that incorporated enthusiasm: enthusiasm for medicine (categorized as a physician characteristic, 19 references); enthusiasm for teaching/commitment to teaching (teacher characteristic, 18 references); enthusiastic person in general (human characteristic, 14 references): “The most valuable asset to any university is the inspired teacher, the man possessed with that indefinable something which arouses the interest and enthusiasm of the student. Such men are rare in all colleges and all medical schools. How few teachers have the power of making what they say stick in the memory! And how such teachers are prized by the student!”²⁵

Conclusions

Analysis and impressions

It is not surprising that our intuitive, personal assessment of the qualities of good medical teachers produced quite similar results to the themes generated from our search of the literature. The phrasing of our central question, our selection of articles, and our coding process were all influenced by this initial reflection. What surprised us was the dominance of noncognitive characteristics in both explorations: approximately two thirds of the descriptions and themes were classified as noncognitive according to the definitions in our framing exercise. Perhaps what makes a clinical educator truly great depends less on the acquisition of cognitive skills such as medical knowledge and formulating learning

objectives, and more on inherent, relationship-based, noncognitive attributes. Whereas cognitive abilities generally involve skills that may be taught and learned, albeit with difficulty, noncognitive abilities represent personal attributes, such as relationship skills, personality types, and emotional states, which are more difficult to develop and teach.

This study suggests that excellent teaching, although multifactorial, transcends ordinary teaching and is characterized by inspiring, supporting, actively involving, and communicating with students. These activities produce an emotional arousal in the student. Sometimes a relationship is forged between the student and teacher. Sometimes this inspiration arises internally from a personal identification with that teacher. We remember our greatest mentors: we either developed relationships with them or patterned ourselves after them. With ease and aplomb, our teachers performed challenging surgeries, respectfully imparted teaching nuggets to students, and spoke with their patients with compassion, and we wanted to be just like them. Many of our behaviors were similar to those of a child following a parent.

Our intuitive prestatement of the qualities of good teachers did include one important quality which was not as often mentioned in our literature review. This was the quality of self-awareness. The ability to reflect upon one’s teaching skills with the goal of improving teaching was highlighted in only some of the articles.^{26–32} We were surprised that there were no articles that mentioned such characteristics as *aggressive*, *challenging*, or *demanding*, because some of our favorite teachers exhibited these very characteristics. The literature we reviewed contained positive comments, almost exclusively. The terms *aggressive*, *challenging*, or *demanding*, especially the first and last, may have negative connotations for many, and authors, survey respondents, observers, etc., may have avoided them in seeking to characterize excellent teachers.

We are aware of two previous literature reviews on effective clinical teaching characteristics.^{7,8} Both focused on ambulatory teaching and included only

more recent articles (published after 1980); neither asked our central question, “What makes a good clinical teacher in medicine?” Irby and colleagues⁸ concluded from their review that excellent teachers are physician role models, effective supervisors, and dynamic, supportive educators. They recommended increasing trainee contact with faculty members. Heidenreich et al⁷ summarized 11 separate ambulatory teaching characteristics, some similar to ours (e.g., teaching to the learner’s experience, skilled questioning, and giving appropriate feedback). Six of our reviewed articles divided the characteristics of a good clinical teacher in medicine into larger categories that were similar to ours (physician, teacher, and person/human).^{12,20,33–36} Our study is unique in that it includes essays from the early part of the 20th century, although the majority of the characteristics identified in these early essays were also mentioned in the later articles.

Some characteristics from the post-1970 articles were not mentioned in the earlier essays. For example, *provides feedback* was only mentioned once in any of the pre-1975 articles. *Knowledge about teaching skills* was also mentioned rarely in the early essays. The field of medical education started growing in the 1950s and 1960s, and by the early 1970s practices and scholarship grounded in the discipline of education had begun to be influential in medical education. This helps to explain both why surveys, interviews, and observations permeate the literature after then and why these characteristics were not mentioned in the earlier essays. Although we reviewed more pre-1966 titles than post-1966 titles (despite originally identifying more post-1996 titles), this was a function of a liberal review of long lists of pre-1966 titles versus a more selective examination of post-1966 abstracts.

Although we found a multitude of articles addressing our question, the overlap between the two raters (G.S. and R.S.) in the article-selection process was lower than we had expected (Figure 2). We believe this was attributable to the inherent difficulty in finding a concise answer to the question, “What makes a good medical teacher?” Our original list of characteristics was large and unwieldy, but through our coding process,

including discussion and reaching consensus, the list was reduced to the present form. We were constantly aware that our backgrounds biased our intuitive classification scheme. Others with different backgrounds might classify the same descriptions into an entirely different framework. This is a natural characteristic of qualitative data analysis. Finally, we found it quite enjoyable reading these articles, especially the pre-1970 essays, because of their eloquence and because they echoed opinions quite similar to the more recent, survey-based reports.

Implications

Our findings hold broad implications for teacher selection, promotion, and faculty development programs at U.S. medical schools. What is particularly interesting is that many of the characteristics and attributes we found were noncognitive characteristics rather than the cognitive skills that generally receive so much attention in faculty development programs. This is not surprising, given that clinical teachers must ultimately serve as supportive role models and mentors to trainees in their development of knowledge, skills, attitudes, values, and professionalism. Faculty development programs, although highly variable in their mission, usually focus on traditional cognitive skills such as curriculum design, large-group teaching, and assessment of learners.³⁷ Perhaps these skills become the focus of workshops because they can be worked on and developed in the time frame of a workshop, whereas noncognitive characteristics cannot be easily developed or adapted in a workshop or fellowship context. If a number of noncognitive behaviors are truly important for excellent clinical teaching, as our search suggests, perhaps they should receive greater emphasis in the curriculum of these workshops. Noncognitive behaviors are both measurable and alterable. Most of them, such as personality typology, emotional states, and relationship predispositions, have underlying neural networks which are entering our sphere of understanding.³⁸ It is likely that our findings, such as the importance of supportive relationships between clinical teachers and their students, have implications that should be explored for the training, hiring, and promoting of

clinical teachers in medical education as well as other professions.

The identification of 49 different themes mirrors the multifactorial nature of effective teaching, yet it may also indicate limitations in our understanding of what makes a good clinical teacher in medicine. We suspect that the identification of these characteristics is an immature field at best, and we wonder whether the accurate “diagnosis” of good clinical teaching might not be achieved by the continuation of rigorous scholarship. We were surprised by the heterogeneity of methodologies that have been used to answer our central question (See Table 1). We found more opinions than empirical data about good teaching, especially data relating student performance to distinguishable and measurable teaching behaviors.

Four studies of particular importance attempted to correlate student performance with student perception of teaching quality. One used a global rating of teaching.³⁹ The remaining three used measurable teaching behaviors for their correlations,^{13–15} and although all three demonstrated a positive correlation between some teaching behaviors and student performance, the effect was either small¹⁵ or inconsistent across various measures of student performance.^{13,14} One study correlated students’ evaluations of their first-year clinical teachers with assessment of the same students’ clinical performance by their subsequent clinical teachers.¹³ The other three relied on student ratings of “good teaching.”^{14,15,39} The Anderson et al¹⁴ study is notable in that students who had previously rated their teachers more positively also had higher OSCE scores.

Many of the opinions used in these four studies were garnered from student evaluations, which are relatively easy and inexpensive to obtain but are, by themselves, hardly objective measures of teaching performance and may depend largely on faculty popularity.^{35,40} Furthermore, they are also biased by the “halo effect” (student esteem for faculty influences grading), or trait-based evaluation predispositions (higher-performing students rate instructors more highly).⁴¹ Clearly, solid evidence supporting a causal relationship between

good teaching and student learning is lacking.

New areas for research

Superb teaching is certainly a complex phenomenon. What makes a good teacher is likely different to different students and probably even varies by occasion. Furthermore, teaching depends on multiple dependent factors, such as teacher knowledge, student knowledge, teacher personality, whether the *student* got a good night’s sleep the night before, whether the *teacher* got a good night’s sleep before—there probably are hundreds of factors that contribute to good teaching, just as hundreds of factors contribute to complex biologic systems. The human liver operates rather autonomously in most of us, yet its function is dependent on a multitude of very specific variables, not limited to its arterial and venous supply and the various inputs of proteins, carbohydrates, steroids, lipoproteins, and toxic substances. The slightest alteration in these variables can lead to disruptions in hepatic function, which could never be understood without centuries of research that still continues. We argue that the science of medical teaching is a similarly complex system that is also in its infancy. Although it may seem like teaching can never be fully understood, it is imperative that we try, not only to make bad teachers better, but also to maximize the teaching effectiveness of all of us.

Frameworks of clinical teaching in medicine have been rigorously validated, using student, resident, and faculty ratings.^{42,43} We argue for an expansion of the repertoire of knowledge, skills, and attributes considered in the domain of effective teaching. Some suggestions for research related to this review include investigations related to the following questions:

- Which of these teaching characteristics deserve further study? We recommend the critical examination of those of our themes that have not been previously examined, such as enthusiasm for medicine, forming positive relationships, and integrity, among others. Perhaps they would be best measured through triangulation of multiple measures, including observation, self-reflection, and student evaluations.
- Out of these 49 themes of teaching characteristics, which ones actually

influence student learning? Our literature search reveals that students certainly appreciate the personable, patient, and virtuous teacher, but do these qualities help a student acquire the complex skills involved in applying learned knowledge to patient care? We advocate testing on the wards, involving medical students and their teachers, using reliable and valid assessment tools, of the impact of these teaching behaviors on our medical students. Qualitative approaches similar to the one we used in this analysis might be useful for this.

- How do students differ in their response to different teaching characteristics? Perhaps one student might need clearly organized objectives, whereas another might respond to a less organized yet enthusiastic clinical teacher. If students differ in their needs, as we suspect, perhaps they can be explicitly encouraged to prepare differently for learning encounters. Most students intuitively prepare differently, for example, when they know they will be learning from a teacher with superior clinical knowledge.
- How can these teaching behaviors, especially the noncognitive ones, be taught and/or developed? We will need to pursue methodologies for new “teach the teacher” processes aimed at the noncognitive behaviors, ones not previously emphasized in faculty development workshops, as well as research that validates their effectiveness.

In our review of the literature pertinent to the question, “What makes a good clinical teacher in medicine?” we identified more than 400 specific descriptions published over almost a century. These descriptions came from a wide array of methodologies, including essays, surveys, qualitative analyses, and observational studies, but from very few empirical data. We clustered these specific descriptions into 49 themes and then clustered these themes into three broader clinical educator categories—the physician, the teacher, and the human. These categories and themes have broad application in faculty development and student learning.

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Appendix 1

Characteristics of Good Clinical Medical Teachers from the Literature, 1909–2006

Category/code with references (Total no. of citations)	Example descriptions	Typical quotation(s)
Physician characteristics		
Demonstrates medical/clinical knowledge* 6,11,15,20,23,24,27,33,36,45,47–51,54,55,58,59,61,62,64,66,67,70,73,74,77,79 (30)	Demonstrates knowledge, expertise, mastery of subject, thorough knowledge, breadth of knowledge, knowledge of general medicine, understanding of the multicultural society in which medicine is practiced, intensively trained in medicine	"... our clinical teacher should have attained to a reasonable mastery of his own field of work. He should himself have acquired skill in... the accumulation of data concerning the structures and functions of the patient to be examined." ⁴⁸ "All of the attending physicians described the importance of general medical knowledge..." ⁷³
Demonstrates clinical and technical skills/competence, clinical reasoning* 11,12,15,19–21,30,32,35,48,49,51–53,55,57,58,62,64,66,67,69,73,74,77,79–81 (28)	Demonstrates clinical competence, clinical acumen, clinical reasoning skills, can correlate and synthesize, diagnostic competence, technical expertise, clinical aptitude; models clinical practice, skills in managing patients, viewing patient as a whole; links book facts with clinical practice	"This knowledge is used to verify clinical diagnoses, to check on learners' progress, to stimulate the teaching of practical tips on patient care, and to motivate learning." ⁷³ "... (residents) learn by following faculty reasoning, as the supervisors articulate their thoughts about an individual case." ⁶⁴
Shows enthusiasm for medicine* 6,11,12,14,16,21,27,32,45,49,50,52,54,56,59,62,63,68,77 (19)	Demonstrates enthusiasm for medicine, for a specialty in medicine	"Indeed, he should be so full of his subject that his interest and enthusiasm should be so infectious that his students could not help becoming vitally interested in his field." ⁵⁹ "Love for our calling and enthusiasm for our science, an ideal to strive for, was given to me..." ⁵⁶
Models a close doctor–patient relationship† 12,17,18,30,34,54,56,68,70,77 (10)	Establishes/models doctor–patient relationship, available and accessible to patients, spends time with patients in front of students	"... the clinician serves as a role model by demonstrating the bedside manner, decision-making, and leadership skills that comprise effective patient care." ⁶⁸ "Conducts the (patient) interview with patience and gentleness; is sensitive to the patient's reaction." ¹⁸
Exhibits professionalism* 16,21,24,48,66,68,77,80 (8)	Professional, commitment to lifelong learning, willingness to develop both as doctor and as teacher, commitment to personal and professional development as a doctor, commitment to professional audit and peer review, maintains high standard of professional and personal values in relation to patients and their care, knows limits of his or her medical abilities, reflective of own practice, takes pride in work	"... he should know his own limitations of knowledge and skill (and) should frankly acknowledge these limitations, and should call to his aid when required, those who are more expert..." ⁴⁸
Is scholarly* 25,49,50,57,77 (6)	Does research, understands research methods	"Only teachers who are themselves in the closest touch with medical science can impart these scientific habits of mind and provide him with a foundation on which he can build in after years." ²⁵
Values teamwork and has collegial skills† 21,48,49,54,66,77 (6)	Works well in team setting, demonstrates commitment to multiprofessional teamwork, inspires loyalty in coworkers, demonstrates benefits of close collegial relationships, uses consultants well	"Particularly, he should be broad minded towards the others in his department, and able to see what they are doing and why they are doing it." ⁴⁹ "In medical practice, as everywhere else that human beings must live in close association, one with the other, the old adages 'In union there is strength,' and 'A house divided against itself cannot stand' are even more true today than ever before." ⁵⁴
Is experienced* 47,53,66 (3)	Experience, seniority	"The ideal teacher in medicine should be one with a sound critical experience in clinical medicine. He should know men and humanity." ⁴⁷ "Lessons from years of experience... cannot be conveyed in a seminar or found in books." ⁶⁶
Demonstrates skills in leadership and/or administration* 48,68 (2)	Leadership in patient care, a good executive	"He should know how to inspire loyalty in his coworkers. He should be a good executive, knowing how to plan the work of his department..." ⁴⁸
Accepts uncertainty in medicine* 23 (1)	Accepts uncertainty in medicine	"The attending physician can show that what improves is the ability to tolerate this uncertainty and to make decisions with the same limited information." ²³ (Appendix Continues)

Appendix 1 (Continued)

Category/code with references (Total no. of citations)	Example descriptions	Typical quotation(s)
Teacher characteristics Maintains positive relationships with students and a supportive learning environment [†] 11, 14, 17, 21, 22, 24, 29, 31–34, 36, 48, 49, 58, 59, 65–67, 69, 72, 74, 77–79, 82 (27)	Maintains positive learning climate of respect and support for students; creates facilitative and comfortable learning environment, encourages students, respect for trainees, respect for trainees as peers; receptive to students, genuine interest in students; positive relationships; cares about students; shows unconditional positive regard for students; shows love for youth; students like him or her and want to work with him or her; interested in students; ready to hear a student's troubles; aware of needs and problems; curious about trainee's personality, norms, and values; sensitivity and responsiveness to the educational needs of the students and junior doctors, provides safe environment, corrects mistakes without belittling	"The factor of feeling relaxed or comfortable to facilitate learning occurs when the environment is comfortable and residents feel at ease, not anxious, tense, or under pressure or stress." ⁷⁴ "Good teachers create an atmosphere where students are motivated by the intrinsic rather than the extrinsic (passing the next exam, getting a high grade)." ³¹ "Initiate teaching discussions. Know your students' names." ⁷⁸
Demonstrates enthusiasm for teaching [†] 12, 14, 17, 20, 22, 27, 30, 31, 34, 36, 49, 50, 53, 67, 69, 74, 77, 81 (18)	Demonstrates enthusiasm for and enjoyment of teaching, love of interpreting and expounding ideas, sense of teacher identity	"Without a genuine love for teaching, I believe, very few men can be good teachers. It is an inborn faculty, which no doubt can be cultivated, but not created, by practice." ⁵³ "Energetic and interested in teaching, positive attitude, enjoys their job, doesn't complain." ⁸¹ "Easily accessible, willing to come in after hours, answers pages promptly and courteously . . ." ⁸¹
Is accessible/available to students [†] 13–15, 17, 18, 30, 33, 34, 36, 65–67, 69, 74, 76, 81 (16)	Extensive involvement with students, spends time with students, spends time explaining, allows sufficient time for discussion and questions, is helpful when called after hours, has more teaching responsibilities, available and willing to help, observed more frequently taking histories and performing physicals	"Answers to questions clearly and definitively, summarizes teaching points, able to explain difficult topics." ⁸¹ ". . . had the ability to compress his teaching into a single anecdote." ⁵⁶
Provides effective explanations, answers to questions, and demonstrations [*] 1, 11, 14, 19, 34, 49, 51, 52, 56, 59, 66, 67, 69, 74, 80, 81 (16)	Provides clear, simple, lucid, logical explanations; links subject matter with experience; creates conceptual frameworks, uses illustrations, uses anecdotes; teaches fundamental principles, approaches to problems, and basic concepts, and not simply facts; dramatizes, using suspense and surprise, demonstrates procedures; good at explaining difficult subjects; able to communicate ideas and knowledge clearly and presents discussions in clear, lucid, and organized fashion; answers questions carefully sharing knowledge, repetition of facts and clinical problems	"All of these teachers gave large amounts of feedback to the learners. Since it was routinely embedded in teaching, the students frequently failed to perceive it as feedback." ⁷³ "Encourages two-way communication, provides timely positive and negative feedback." ⁸¹
Provides feedback and formative assessment [*] 14, 16, 19, 29, 32, 52, 65–67, 69, 73, 77, 78, 80, 81 (15)	Provides prompt and constructive feedback, provides fair and constructive criticism without belittling	"A few basic principles, well fixed in the student's mind will be of much greater value than a wide generalization which is quickly forgotten." ¹¹ "The good teacher's teaching style is to present material or lead discussions in an organized, clear fashion, emphasizing conceptual understanding of the subject and problem solving, making difficult concepts easy to understand . . ." ⁶⁹ "Exemplar faculty were considered highly able to identify competencies critical for their success and applicable to other faculty." ⁷¹ "A competent [teacher] needs to understand different teaching methods and know when and how to apply various methods." ³² "For the rest of us, a study of these [educational] principles will be most rewarding." ⁶
Is organized and communicates objectives [*] 6, 11, 14–16, 19, 24, 30, 57, 63, 66, 67, 69, 70 (14)	Organized for teaching, sound planning for teaching, specifies objectives and expectations, defines realistic objectives, sets clear goals	
Demonstrates knowledge of teaching skills, methods, principles, and their application [*] 6, 27, 29, 32, 35, 48, 50, 55, 58, 71, 73, 77 (12)	Practical teaching skills	

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Category/code with references (Total no. of citations)	Example descriptions	Typical quotation(s)
Stimulates students' interest in learning and/or subject [†] 6,22,25,31, 45,46,51,52,59,68,70,80 (12)	Motivates students to learn, stimulates students, capacity to make them want to see and despair when they cannot, arouses students' curiosity	"The most valuable asset to any university is the inspired teacher, the man possessed with that indefinable something which arouses the interest and enthusiasm of the student." ²⁵ "The stimulus and direction given by a wise teacher are often of far greater importance than the subject matter taught." ⁵² "The ability of medical school faculty to stimulate intellectual curiosity is of primary importance . . ." ⁶⁸
Stimulates or inspires trainees' thinking [†] 11,14,44,45,49,50,54,57,65,74, 78 (11)	Inspires students to think beyond facts, stimulates students to ask questions, stimulates intellectual curiosity and self-directed learning, facilitates students' clinical reasoning, encouraging trainees' independence of thought, encourages students to question the attending, guides the students' understanding, nondogmatic in teaching, asks challenging questions	"The problem is getting them to weigh evidence, draw accurate inferences, make fair comparisons, invent solutions, and form judgments." ⁴⁴ "Teach the student to think, to reason problems out for himself and to do things for himself . . ." ¹¹ "Faculty . . . have attached primary importance to their ability to spark intellectual growth and to develop thought processes . . ." ⁶⁹
Encourages trainees' active involvement in clinical work [†] 15, 23,32,64,65,70,74,78–80,83 (11)	Allows and encourages resident participation in patient procedures, encourages independence in patient care; gives latitude for trainee to discover his/her own style and develop own method of practice	"The successful attending physician must allow them to assume personal responsibility for their patients, yet at the same time supervise these activities from a distance." ²³ "Establishment of a personal environment in which the resident is an active participant." ⁶⁵
Provides individual attention to students [†] 6,11,30–32,50,54,69,73, 78 (10)	Provides individual attention, helps to develop each student's personality; focuses teaching to specific needs of each learner; individualizes teaching approach to trainees	"In individualization, the student's past experience must be taken into account. His difficulties should be diagnosed and remedied. His strong points should be used to aid his learning." ⁶ "The good teacher is able to develop a good, positive relationship with the residents, has a genuine interest in residents and is aware of their needs and problems . . ." ⁶⁹ ". . . faculty physicians can improve specific microskills through consistent practice, can reflect on their specific behaviors in one-on-one teaching, and can incorporate better, more effective skills into teaching encounters." ⁷⁵ "Evaluation and improvement of teaching are important aspects of instructional leadership." ¹⁶
Demonstrates commitment to improvement of teaching* 16, 27–32,50,75,77 (10)	Self-reflective about teaching, commitment to audit and peer review of his or her teaching, open to criticism of his or her teaching	"Respecting the autonomy of the learner and nurturing self-directed learning appear to be key elements of teaching effectiveness . . ." ⁷⁰ ". . . encouraging participation, stimulating interest, and encouraging self-directed learning rather than didactic presentations." ⁶⁹
Actively involves students [†] 12, 16,23,31,36,52,59,62,69,70 (10)	Actively involves students, makes the student take an active part, encouraging learning by self-activity, talking less, stimulating give and take	". . . major requirement of an effective clinical teacher is to observe objectively student performance and offer constructive feedback." ¹⁶ ". . . knowledge of specific learners, knowledge of the ward team as a group, and general assumptions about learners by level of training." ⁷³ "In his actual teaching he adopted the Socratic method, tempering its application to individual idiosyncrasies . . ." ⁵¹
Demonstrates learner assessment/evaluation skills* 14,16,32,71,73,77 (7)	Learner-evaluation skills, objective assessment of trainees; alert to deficiencies and gaps in trainee's education, flexible to meet student's needs	
Uses questioning skills* 14, 51,59,74 (4)	Asks questions, be adept in the "art" of questioning, Socratic method tempered to individual's idiosyncrasies, uses student response as guide to the next question	
Stimulates trainees' reflective practice and assessment [†] 18,29, 32,73 (4)		"The [students] indicated that talking about the importance of the doctor–patient relationship were key training activities (and) relevant if the teacher takes time to address the students' concerns, stimulate their thinking, and address their difficulties with comprehension." ¹⁸ "Case-based teaching strategies support experiential learning processes of students and residents by encouraging their abilities to reflect upon experience, develop appropriate generalizations, and predict future effects." ⁷³ (Appendix Continues)

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Category/code with references (Total no. of citations)	Example descriptions	Typical quotation(s)
Teaches professionalism* ¹¹ , 57,68,77 (4)	Capacity to promote development of the required professional attitudes and values, teaches honesty	"... I make a plea for the place of ethics in this matter of setting an example of practice."⁵⁷ "Inadvertently, faculty members may express anger or frustration indiscreetly by making negative comments about another specialty group or a patient's condition."⁶⁸ "The teacher's mastery of the subject, taught with interest and enthusiasm gives a sense of significance and an importance to learning which gains students' respect."²⁴ "The good teacher teaches the efficient use of the senses, and the importance of observation."¹⁹ "We have observed enough situations where changes in diagnostic treatment plans were made after seeing the patient to urge that more teaching be done at the bedside."²³
Is dynamic, enthusiastic, and engaging [†] 24,39,59 (3)	Interesting, enthusiastic, stimulating	
Emphasizes observation* ^{19,32} (2)	Emphasizes observation, observant and analytical (pertains to trainees)	
Other [‡] 14,23,83 (5)	Bedside teaching, supervised adequately, reasonable expectations, useful critique of write-ups	
Human characteristics Communication skills [†] 12, 21,22,27,29,30,32, 34,35,54,58,60,65,66, 67,71,74,75,77,82 (21)	Good communicator, open communication, good interpersonal communication skills, listens well, capable of lucid expression, persuasive	"In order to be meaningful, an educational experience must be implemented in a system that involves two-way communication. The educator (i.e., the faculty) sends a message which the student receives and interprets."⁶⁰ "Further research needs to identify the shared language that physicians and their students use and how that language (both the talk and the process of talking) can be used most effectively in clinical education."⁷⁵ "Not only do clinical teachers teach much of the content and skills residents learn, they also model the attributes, behaviors, and values residents acquire."⁷² "Role models are thus a powerful force in the learning process and identifying positive role models and emulating them is a significant component of medical education."²⁰ "Role-modeling is a powerful teaching technique and one especially well suited to the apprenticeship system of instruction in medicine."¹⁶ "[Vitality] is essential. The teacher must obviously be alive, and must convey this living quality to his subject."¹ "The teacher has a double function. It is for him to elicit the enthusiasm by resonance from his own personality."⁵⁰ "The development and fostering of the humane side of a personality, with a sympathetic and understanding attitude, should be a silent, possibly, but ever present part of the curriculum..."⁵⁴ "... should also have those qualities of mind and heart that make them like him and desire to work with him."⁴⁸ "A kind word, a sympathetic attitude toward the student who has difficulties, will often yield a handsome educational dividend."⁵² "Finally, our teacher must have a love for youth and a patient, tolerant understanding of it."⁵⁸ "The trainer should have respect for the trainee, should not demean the trainee, especially not in the presence of a patient."³² "... should never be sarcastic with his students."⁴⁸
Acts as role model—other [†] ¹¹ , 14,16,19–22,24,32,50, 57,69,72,80,81 (15)	Role model, sets examples with actions, sets example socially and culturally, inspires ideals, sets a good example in clinical practice	
Is an enthusiastic person in general [†] 1,12,29,32,49,50,51,53, 56,58,59,61,69,81 (14)	Cheerful, eager	
Is personable [†] 6,27,30,35, 48,51,54,60,61,63, 70,74 (12)	Personable, approachable, adept at establishing relationships, friendly, open to meeting people	
Is compassionate/empathetic [†] 6, 12,24,47–49,52, 54,56,58,72 (11)	Compassionate, empathetic, sympathetic, love for fellow people, knows people and humanity, knows feelings and emotions, warm and understanding, humane, extreme kindness	
Respects others [†] ^{11,20,30,32,48, 56,60,61,68,70} (11)	Respectful of others, respectful and not belittling, polite, tactful, not sarcastic, does not use fear, prompt	

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Category/code with references (Total no. of citations)	Example descriptions	Typical quotation(s)
Displays honesty/integrity [†] 1,11,20,30,32,44,56,58,72,81 (10)	Integrity, honest, sincere, sincerity, congruence, demonstrates internal consistency, passion for the truth, unlimited devotion to the truth	"... in medicine the verities have a trick of changing, but he must try and tell the truth as he sees it." ¹ "Genuine, honest, open, up front, willing to admit when wrong or doesn't know." ⁸¹
Has wisdom, intelligence, common sense, and good judgment [†] 1,6,48,50,51,55,58 (7)	Intelligent, wise, judgment, common sense	"To organize learning purposefully, the teacher needs wisdom, maturity, judgment..." ⁶ "In a sense, knowledge shrinks as wisdom grows; for details are swallowed up in principles." ⁵⁰
Appreciates culture and different cultural backgrounds [†] 1,24,25,48,53,56 (6)	Broad cultural background, cultured in many fields, appreciates music, literature, and is well read, good breeding	"The example of the teacher socially, culturally, as a citizen and as a representative of her profession sets motivational goals for the learner." ²⁴ "What impressed me so greatly... was... a most human doctor, a man truly cultured in many fields." ⁵⁶
Considers others' perspectives, viewpoints [†] 11,49,52,58,74,81 (6)	Tolerant of viewpoint of others, nonjudgmental, tolerant, broad minded, considers multiple perspectives	"The teacher accepts the pupil as the predominant partner in the work of education, and arrives at a result that shall contain a large contribution from the free activity of his mind." ⁵²
Is patient [†] 34,49,58,81 (4)		"He should have patience with his students, with the dull man, the laggard." ⁴⁹ "... allows adequate time for teaching, not hurried or rushed, or distracted." ⁸¹
Balances professional and personal life [†] 22,32,68,81 (4)	Balanced personal perspective, being able to separate private life and teaching	"Medical school faculty members should demonstrate that they have interests and abilities outside of medicine." ⁶⁸ "... achieves a healthy balance between professional/personal/spiritual/physical life." ⁸¹
Is perceived as a virtuous person and a globally good person [†] 33,36,49,55 (4)		"I might say that the full-time man in theory needs to be a paragon of virtue, having qualities which no man approaches in reality." ⁴⁹
Maintains health, appearance, and hygiene [†] 1,48,58 (3)	Good hygiene, good physical and mental health, vitality, stamina	"He should be systematic and hygienic in his habits..." ⁴⁸
Is modest and humble [†] 49,56,61 (3)	Unpretentious	"He should have a sense of modesty, and be able to appreciate others. He should have the ability to see his own mistakes." ⁴⁹ "He should have certain inherent qualities of 'command,' including a natural dignity, modesty, and quiet force." ⁶¹
Has a good sense of humor [†] 31,49,61 (3)		"He should have a good sense of humor." ⁴⁹ "... the intrinsic triumphs over the extrinsic when we as teachers manifest the best qualities in human relations—openness, respect, trust, a sense of humor." ³¹ "Of great advantage is an ability to meet people easily, to show a willingness to respect their ideas, to have a native cheerfulness or friendliness, and a sense of humor." ⁶¹
Is responsible and conscientious [†] 35,53,58 (3)	Conscientious, responsible citizen	"I envisage first of all a responsible citizen of rugged integrity and stamina..." ⁵⁸ "The clinical teachers whom I have known in close range... were a devoted, conscientious, enthusiastic group..." ⁵³ "social conscience." ³⁵

(Appendix Continues)

Appendix 1		
<i>(Continued)</i>		
Category/code with references (Total no. of citations)	Example descriptions	Typical quotation(s)
Is imaginative [†] 26,50,58 (3)		"The whole art in the organization of a university is the provision of a faculty whose learning is lighted up with imagination." ⁵⁰ "I advise teachers to cherish mother wit . . . smuggle in a little contraband wit, fancy, imagination, thought." ²⁶
Has self-insight, self-knowledge, and is reflective [†] 29,32 (2)		"A good [teacher] has self-insight, self-knowledge and the ability to reflect on situations and actions." ³²
Is altruistic [†] 49,53 (2)	Altruistic, unselfish	"Being human, their motives were variously mixed; but I believe that those related to altruism and public spirit far outweighed those essentially selfish." ⁵³ "He should have industry, patience, unselfishness . . ." ⁴⁹
Other [‡] 6,24,32,48,49,53,61,66 (12)	Maturity, self-control, self-confident, flexibility, should be objective but have firm convictions, dignified, industry, curiosity, not poor, married and father of children, play outdoor sports, devoted	" . . . he should seek relaxation regularly in some form of outdoor sport . . ." ⁴⁸

* Cognitive characteristics (162).
† Noncognitive characteristics (301).
‡ Neither cognitive nor noncognitive characteristics (17).
Total (480).