From feedback to action: Physicians’ teaching performance in residency training
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Chapter 1

Introduction
Introduction

The central topic of this thesis is the use of residents’ feedback in individual teaching performance of faculty. First, we explore the overarching concept of this thesis: professional performance in health care. Second, we discuss the feedback mechanisms that may support professional performance. Third, we focus on the use of residents’ feedback in teaching performance of individual faculty. We conclude the introduction with the global research aim of this thesis, the specific research questions and an overview of the materials and methods.

Professional performance

Definition

To establish a definition of professional performance for this thesis, we used the well-known and widely used definition of a professional as ‘a physician committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behavior’. Placed in a Dutch context, the Royal Dutch Medical Association (KNMG) defined professional standards for physicians in 2007 as the values, behaviors and relation of physicians with the population that supports and justifies the trust of people in physicians.

The other half of our professional performance definition refers to performance, defined by the Oxford English Dictionary as ‘the action or process of performing a task or a function’. In medical literature it has simply been described as something one does, to distinguish it from competence which is what one can do. In other words, competencies can be viewed as the ‘in vitro’ experience, where performance would be representing the ‘in vivo’ situation. Combining performance with what constitutes being a professional creates a broad definition of professional performance while leaving enough room for the aforementioned importance of context and type of the task on performance. As a result, physicians’ professional performance entails the actions and processes related to the everyday work of professionals in performing their tasks whilst adhering to the values, behaviors and relation of professionals to the community that supports and justifies the trust of people in professionals working in health care.

Historical perspective

Before we continue to discuss physicians’ professional performance, feedback and teaching performance, we will first summarize three pivotal moments in medicine and medical education. This provides an insight in the developments over the last century and highlights the need for high quality medical education and the efforts made to achieve it. First, the Flexner report is regarded as a very, if not the most, influential report in medical education dating from 1910. Flexner called to integrate modern science into university-based curricula and increase the prerequisites to enter medical training as well as to
strengthen regulation of medical licensure. Today’s admission requirements and the fact that medical training is firmly grounded in the basic sciences show the influence the Flexner report.

Flexner’s principles have proven timeless since current reforms also stress the need to align medical training to population needs, something Flexner called upon over one hundred years ago.

A second major reform in medical education started from McMaster University in Canada, where Dr. Barrows and colleagues started the development of what was to become problem-based learning (PBL).\textsuperscript{6} The main goal of the PBL reform was to change students’ learning from passive knowledge memorization into contextualized active learning. PBL had two educational objectives: the acquisition of an integrated body of knowledge related to the problem, and the development or application of problem-solving skills. Furthermore, the ability to continuously evaluate one’s own abilities and effectively use available resources to meet these identified needs was and still is a vital part of PBL.\textsuperscript{7} From the 1970s, PBL spread from Canada to other parts of the world as the number of medical schools that adopted PBL increased.\textsuperscript{7}

Third, in 2002, the American Board of Internal Medicine (ABIM), American College of Physicians-American Society of Internal Medicine (ACP-ASIM), and the European Federation of Internal Medicine (EFIM), published a perspective on medical professionalism in the new millennium.\textsuperscript{8} They described challenges such as the explosion of technology, changing market forces, inequity in health-care, bioterrorism and globalization with additional stress from political and legal forces. These challenges put stress on the doctor-patient relationship and the physician-public relationship. To reaffirm fundamental and universal principles and values of medical professionals, the aforementioned organizations published the physician charter.\textsuperscript{8} The physician charter called for a renewed sense of professionalism, in line with the notion that professionalism is an evolving social construct.\textsuperscript{9} The charter aimed to ‘support physicians and health-care systems to remain committed to patients’ welfare and to the basic tenets of social justice’.\textsuperscript{8}

**Professional performance in competency frameworks**

Many stakeholders have ideas about professionals and about the expected competencies and performance of these professionals. These implicit standards have repeatedly been made explicit, often for educational purposes, to provide guidelines for performance of professionals. The Hippocratic Oath can be seen as a very early example. More recent examples are ‘Tomorrow’s Doctors’ of the General Medical Council (GMC) in the United Kingdom, the Accreditation Council for Graduate Medical Education (ACGME) and the Canadian Medical Education Directions for Specialists (CanMEDS) framework.\textsuperscript{10-13} The GMC report describes the knowledge, skills and behaviors that medical students should demonstrate when completing medical school. The overarching outcome should be that ‘graduates will make the care of patients their first concern, applying their knowledge and skills in a competent and ethical manner and using their ability to provide leadership and
to analyze complex and uncertain situations’. Furthermore, the ACGME also provides guidelines and program requirements for residency training. While sharing the values of the Hippocratic Oath, the ACGME and GMC frameworks translate today’s demands and public expectations of professionals in medicine to professional standards. Probably the best known competency framework in the Netherlands is the CanMEDS framework which describes the knowledge, skills and abilities that specialist physicians need in order to provide high quality patient care. The combination of skills and abilities are expressed in seven professional roles that physicians are expected to be competent in: medical expert, communicator, collaborator, manager, health advocate, scholar and professional. The visualization of the framework as a six-petaled flower has become the trademark of the framework, at the heart of which we find the medical expert. Many other frameworks were based on the CanMEDS framework, such as the Dutch competency framework and the VetPro framework for veterinarians. The Veterinary Professional (VetPro) framework is an interesting framework, because it places the professional, rather than medical expert, at the heart of the framework. The many frameworks regarding competencies show that there is not one sole vision or framework that covers everything and remains valid over time. Moreover, the competency frameworks reflect the societal and medical progress capturing the changing demands of the profession, professionals and the way they provide patient care.

Professional performance and the need for feedback

The continuously changing professional standards present professionals with a challenge to meet and possibly exceed these standards. Professionals are held responsible for their own work, staying up-to-date on knowledge and skills, being reflective on their own practice and adjust or adapt according to what is expected of being a professional. Inherent to being a professional is one’s ability to engage in lifelong learning which can be described in three components: motivation and learning beliefs, attention to learning opportunities and skills in seeking information. Lifelong learning should support physicians’ professional performance and enable continuous performance improvement. Khan’s model of performance, adapted from Ten Cate, is a model to understand and discuss performance improvement. Training and deliberate practice are suggested to be the two driving forces to improve performance, one not excluding the other. For example, student performance might depend more on the training whereas physicians’ expert performance is more dependent on deliberate practice. Engaging in practice activities with the primary goal of improving some aspect of performance is an integral part of deliberate practice. Ericsson indicates that feedback on performance is needed when deliberately practicing a task. However, Regehr and Eva stress the importance of not relying solely on deliberate practice to maintain adequate performance. Deliberately practicing a certain aspect of performance until expert performance is achieved, may not be applicable to address all performance gaps; since performance gaps may be the result of a lack of motivation to become an expert and therefore deliberate practice only may not yield the intended
outcome. Professional performance does not imply being an expert in everything, it should imply knowing your expertise and gaps and addressing these in a professional way—sometimes through hard work to become better in something that may not be your first interest (because the first interest is often your field of expertise). In conclusion, gathering performance feedback is essential to gain insight in one’s area of expertise and possible performance gaps.

This closely relates to professionals who are responsible for managing their own performance. We assume that feedback from others is useful information, because the adequacy of assessing one’s own performance (self-assessment) is limited. Self-assessment was found not to correlate well with more objective measures of performance and the least competent professionals were also found to be the least able to self-assess accurately. Thus, feedback on professional performance is considered essential for possible performance improvement, because of the limited ability to self-assess accurately. This discrepancy has also been noted between self-assessed teaching performance by individual faculty and teaching performance of faculty perceived by residents. However, it is important to notice that the definition of self-assessment varies between grading performance and gathering feedback to inform one’s self-assessment. To clarify this: informed self-assessment describes a flexible, dynamic process of accessing, interpreting, and responding to varied external and internal feedback.

**Feedback on professional performance**

**Definition**

Feedback originally came from physics when coupling output signals back to the input circuit, for example resulting in amplification of auditory signals. Thus, feedback describes the influence of one part on the other, often revealing a gap between the object and the reference. This can also be seen in performance feedback, in which the provision of information about an individual or group performance is used to reinforce good performance or to correct poor performance to close the ‘gap’. Based on a review of the medical education literature on feedback, Van de Ridder and colleagues propose the following definition: feedback in clinical education is specific information about the comparison between a trainee’s observed performance and a standard, given with the intent to improve the trainee’s performance. In this definition, ‘trainee’ could also be replaced by medical student or physician to broaden the definition and include lifelong learners, such as practicing physicians, in this definition.

**The intended purposes, effects and possible pitfalls of performance feedback**

From the viewpoint of a professional, gathering feedback to gain insight into one’s own professional performance can be interesting because it offers the possibility to improve. In clinical practice, multi-source feedback systems are used for the purpose of maintaining or improving professional performance. A systematic review on the impact of assessment
and feedback on clinical performance showed that feedback provided by a credible authoritative external source over a number of years has a positive effect on physicians’ clinical performance. In addition, a Cochrane review reported that effect of feedback is generally small to moderate and the relative effectiveness is likely to be greater when baseline adherence to recommended practice is low and when feedback is delivered more intensively. Also, the type of feedback and the way it is provided influences the effectiveness of feedback on performance. Clearly, the influence of feedback on performance is a complex and multi-factorial construct. The role of feedback in professional performance is further complicated by the many stakeholders interested in professionals’ performance. Looking at medical practice, patients would probably like to know where or by whom they could get the best treatment. Insurance companies and governmental bodies are interested in performance data because then they may promote health care through financial impulses. It is therefore essential to clearly define the purpose of gathering feedback and also to determine who has access to the feedback if it is not verbally exchanged. Although public accountability requires insight in professionals’ performance, the purpose and intended outcome of gathering data on individual performance should be clear at all times. Measuring individual professional performance can be a delicate topic because it is known that feedback, and especially negative feedback, can have detrimental and unintended effects on performance.

A strong recommendation from the United Kingdom’s National Health Services is that any performance measure to be used at a national level needs to be piloted and carefully evaluated to assess its potential benefits and pitfalls before national adoption. From a validity point of view, rigorous testing of measurement instruments is needed, but often lacking. This is a first and important step towards the ultimate aim to achieve high performance of professionals. Therefore, feedback systems should have a formative design which supports the aim to benefit learners.

**Feedback theory**

We discuss two important papers on feedback to expand the theoretical basis of feedback and its (expected) effect. First, Kluger and Denisi wrote a landmark review on the effects of feedback and proposed a Feedback Intervention Theory. Second, Shute wrote a detailed overview of formative feedback, which aims to inform individuals on how they are doing and provide cues on where or how to improve.

A widely held assumption is that feedback enables performance improvement. Kluger and Denisi wrote a comprehensive historical literature review and performed a meta-analysis on the effects of feedback interventions on performance. Their main finding was that there were also negative effects of feedback interventions on performance that could not be explained. This led them to develop a preliminary theoretical model in which the effect of feedback interventions is determined by three levels of control, namely task learning, task motivation, and meta-tasks to explain the effect of feedback on performance. First, if the task is unknown and professionals are able to generate realistic, objectively correct...
hypotheses that they can then test, the learning effect is expected to be positive. Second, task motivation can increase when there is a discrepancy between the feedback-standard and one’s own performance. However, efforts reduce when the standards are not raised in case of a positive discrepancy, or when self-efficacy (one’s belief in one’s own ability to succeed) is low in case of a negative discrepancy. Third, when attention shifts from the task-goal to self-goals such as self-esteem or control, interdependent and complex meta-task processes are activated and these influence successful performance improvement. In other words, the relationship between feedback and its effect on performance is complicated and deserves further attention.

Shute wrote a comprehensive review of the theories and outcomes of feedback, and more specifically formative feedback. She defined formative feedback as information communicated to the learner with the intention to modify the learner’s thinking of behavior in order to improve learning. Therefore, the aim was to identify the features of formative feedback that are the most effective and efficient in promoting learning, and to determine under what conditions that would hold. Among the theories that were discussed, the theory of Bangert-Drowns stands out by focusing on the states a learner can be in when receiving (text-based) feedback. The cyclical model is similar to other learning cycle theories that also describe the reaction and action of learners after gathering performance information. Bangert-Drowns emphasizes that feedback can promote learning if it is received mindfully. Mindfulness is a construct that is summarized by Dempsey, based on the work of Salomon and Globerson, as ‘a reflective process in which the learner explores situational cues and underlying meanings relevant to the task involved’. Shute proposed a number of directions for future research to further increase an understanding of feedback, learning and eventually performance improvement. We chose to focus on determining the nature and quality of a feedback message and investigating the association between feedback and performance.

Teaching performance

Needs of a changing world

In the paragraph ‘Historical perspective’, we have summarized pivotal reports and changes that lead to the design of our current health care and educational system. Still, today’s health care and training possibilities are evolving and developing rapidly. The aging population and high costs of health care are two of many difficulties ahead. Globally, there is inequity of employment of health professionals, unequal sharing of the spectacular advancements in health care and discrepancies in the balance between financial expenditure and disease burden. Plochg and colleagues describe the long-term evolution of population health needs and the predominant responses to these changes in the organization of health professionals. Over centuries, the organization of professionals has been aligned with the health needs of the population. In the 20th century, multiple health specialists thought about man-made diseases related to lifestyle in a reductionist way. The 21st century requires
system-based thinking to address ongoing degenerative diseases and societal stress in a
global knowledge-based economy. The transition to ‘21st century proof’ professionals will
have to come from today’s health professionals and trainees. Since trainees represent the
future’s workforce, their training should provide all the skills needed to become 21st century
professionals. Professionals recognize the need for system-based thinking and many are
working hard to bridge gaps between specialties. New specialties, such as the hospitalists,
may symbolize this more system-based approach to patient care. On a visionary level,
Frenk and colleagues advocate a need to transform education to strengthen health systems
in a new century. In addition, the importance of educating future generations to deal with
the challenges on the road ahead of us is a global topic which receives attention from many
disciplines other than medicine. For example, the Organization for Economic Co-operation
and Development (OECD) published a high-impact report on primary education that places
teaching and the role of the teacher in the center of the discussions. All these global
movements stress the need to investigate the way people adjust their performance in light
of the changing and new requirements they are presented with.

The workforce of the future
The importance of education to continuously meet the needs of a changing world has
been underscored by the ACGME. Their mission statement is the advancement of health
of the citizens of the United States through enhancement of Graduate Medical Education
(GME). Furthermore, the Association of American Medical Colleges (AAMC) released
a report in 2013 on Teaching for Quality – Integrating Quality Improvement and Patient
Safety Across the Continuum of Medical Education. The report stresses that all faculty
need to be proficient, that is, practicing and teaching quality improvement and patient
safety principles in the context of every day work. Additionally, some faculty will need
to be expert educators, that is, creating and disseminating curricula and being skilled in
formal teaching principles and assessing physician development. To maintain high quality
patient care in this world of changing needs and requirements of health professionals,
it is vital to train doctors to become high-performing professionals. As described above,
this requires teachers who are able to train the workforce of the future. Undergraduate
and (post) graduate training precede independent practice as a doctor. Although the
basis for practice is provided in undergraduate programs, there is a need to focus on
graduate medical education, since that is the essential step from training to independent
practice. The ACGME also describes residency training as an essential dimension of the
transformation of the medical student to the independent practitioner along the continuum
of medical education. For example, residents’ learning about quality and patient safety
is largely through a positive informal curriculum at the clinical workplace, rather than via
a formal curriculum. For the resident, the essential learning activity is interaction with
patients under the guidance and supervision of faculty members who give value, context,
and meaning to those interactions. The people who are predominantly responsible for
this workplace learning and ensuring patient safety are supervising physicians. The ACGME
glossary of terms describes ‘clinical supervision’ as ‘a required faculty activity involving the oversight and direction of patient care activities that are provided by residents or fellows’.

Teaching faculty are defined as ‘any individual who has received a formal assignment to teach resident or fellow physicians’. Therefore, we assume that teaching performance is vital to ensure the best possible training for future doctors.

The importance of feedback on teaching performance
Feedback on teaching performance is supposed to be highly relevant for faculty working in residency training. Teaching faculty are not only responsible for their own professional performance as physicians; they should also care for and support residents’ professional performance and development. Within the traditional triad of patient care, teaching and research, teaching performance has traditionally been subordinated, as the focus was mostly on patient care and biomedical research after Flexner’s report. However, focused attention for teaching is even more important because faculty are not formally trained as teachers. Residents who had finished training and started working as faculty have expressed that they feel unprepared for their non-clinical tasks. As noted previously, external feedback is needed to be informed about one’s performance as self-assessment has proven to be often inaccurate. In a residency training setting, residents are possibly the best source of external feedback on teaching performance of faculty. Steinert and colleagues reported that provision of feedback is one of the key features of faculty development initiatives designed to improve teaching effectiveness. The impact of type of feedback, purpose and context are highly important to move forward in identifying not if feedback ‘works’ or not, but to understand why, how and when feedback is helpful to maintain or improve performance.

Aim of the thesis
The aim of this thesis is to measure teaching performance and explore improvement of teaching performance of faculty working in residency training through residents’ feedback.

Research questions
The introduction points out the need to study the use of feedback in residency training for professional –teaching– performance. Nonetheless, we chose to first gather evidence on the assumption that better training would result in better doctors through a systematic review. Not only to test this assumption, but also to identify important aspects that may affect the impact of residency training on patient outcomes. Therefore, the first research question is:

What is the effect of residency training on patient outcomes?

We then focus on the feedback that is provided to faculty in order to support their teaching performance. It is vital to first investigate the content, quality, reliability and validity of the feedback that is provided. We may then focus on its effect on performance and
possibly identify ways to enhance the use of feedback. In other words, the input should be investigated in order to evaluate the output. Therefore, the second research question is:

*What are the psychometric properties of the (obstetrics and gynecology) instruments of a system to evaluate teaching performance and what number of residents’ evaluations is needed per faculty to generate reliable feedback?*

Besides numerical feedback—or scores filled-out in questionnaire instruments—there is increasing interest in the narrative part that is included in most evaluation instruments. Since there is a limited knowledge on the frequency and determinants of the written comments that are so often used, we continue with the third research question:

*How frequently do residents give positive comments and suggestions for improvement within their narrative feedback to their teaching faculty and were higher or lower frequencies of positive comments or suggestions for improvement associated with teaching performance, hospital, faculty and resident factors?*

To further our understanding of the narrative feedback on teaching performance we will then focus on the research question:

*What topics of teaching performance do residents address in the suggestions for improvement and how specific are these suggestions for improvement phrased?*

After developing a comprehensive picture on the feedback faculty receive on their teaching performance, we need to discover and explain the potential determinants of teaching performance improvement. The research question of this study is:

*What is the predictive value of residents’ numerical feedback scores, the number of positive comments, the number of suggestions for improvement, and faculty’s participation in completing a self-evaluation on improvement of teaching performance in subsequent years?*

Additionally, it is essential to investigate faculty’s experiences with receiving feedback on their teaching performance, in order to explain how they act subsequently. Therefore, we next focus on the following research question:

*How do faculty proceed after receiving feedback on their teaching performance and what determines their progression?*

Finally, given the lack of practical strategies on how to make the best use of feedback, we aim to support faculty who receive feedback and want to improve their teaching performance with the last chapter, a reflective practice-based guide:

*Twelve tips to make the best use of feedback.*

### Materials and methods

Before proceeding to the chapters in which specific methods are explained, we start with an overview of the materials and methods used in this thesis. We will provide an overview
of (1) the system used to gather data on teaching performance of teaching faculty engaged in residency training, (2) the participants, (3) the setting of the studies, and (4) the methods.

**SETQ – System for Evaluation of Teaching Qualities**

First we will discuss the System for Evaluation of Teaching Qualities, or SETQ, and its development from 2005 onwards. Two people greatly contributed to the development of SETQ: Dr. Kiki Lombarts, an associate professor in physicians’ professional performance with a special interest in teaching performance in residency training and Dr. Martin Bucx, an anesthesiologist highly involved in residency training and keen to know how residents felt about his teaching. The Stanford Faculty Development Program-26 (SFDP-26), a high-quality assessment instrument, provided a scientific base for the initial SETQ questionnaire development.\(^{53, 54}\) We translated the SFDP-26 into Dutch and discussed the content of the instruments with residents and faculty in order to make it applicable to a Dutch context. Thus, a resident-completed instrument evolved which was pilot tested in the anesthesiology department where Dr. Bucx was program director. Analysis of the data from the pilot phase resulted in a feasible, valid and reliable instrument within the SETQ system for anesthesiology.\(^{55}\) Based on the successful pilot the web-based SETQ system –including a faculty self-evaluation instrument– was launched, which made large scale use possible.\(^{55-57}\) As shown in figure 1, the web-based instruments were part of the SETQ system including automatically generated individual feedback reports and a follow-up phase. The SETQ system has developed rapidly and now includes several specialty-specific instruments which have been used by more than 3600 different residents and 3600 different faculty in 210 residency training programs in 40 hospitals.

![Figure 1. The SETQ system components and its cyclical character](image)

**Participants**

Since we conducted all studies included in this thesis in residency training, our participants consisted of residents and faculty. Residents are those involved in specialist training caring for patients under supervision of teaching faculty. Frequently used synonyms for residents in this workplace-based learning situation are trainees, registrars, house officers, interns (first year residents) or fellows (in training for further specialization after residency). The ACGME describes a resident as any physician in an accredited training program.\(^{50}\)
Faculty are physicians who have completed residency training and are fully qualified to independently practice in health care. The ACGME uses the term faculty to describe any individual who has received a formal assignment to teach resident and fellow physicians. At some sites, being appointed to the medical staff of the hospital constitutes being appointed as faculty.50

Study setting
The studies in this thesis are set in residency training programs in the Netherlands. To provide background information that will help enable all readers to interpret and apply our study findings to their setting we will explain how a high school student becomes a fully qualified physician. After completing a six-year duration high school program, graduates proceed to medical school for another six years of education. At all Dutch universities with medical schools the international Bachelor-Master structure is in general use and these universities offer competency-focused, problem-based curricula with two to three years of clinical work. After medical school, a few years of clinical practice as ‘resident not-in-training’ is common before enrolling into residency training programs. Residency training (synonyms: specialty training, postgraduate training or graduate medical education) lasts three to six years depending on the specialty of choice, taking place in both university hospitals and university-affiliated teaching hospitals. General practice training was not included in our studies.

Methods
In order to answer the research questions posed, we used a variety of methods. Table 1 summarizes both the research questions and the corresponding methods used for each of the chapters. We performed a systematic literature review following the guidelines of the Cochrane Collaboration. We used psychometric analysis to assess reliability and validity of the data produced by the SETQ system. This included the use of exploratory factor analysis, inter-item correlation, reliability coefficient alpha and inter-scale correlations. Furthermore, two mixed-methods studies were conducted on the narrative feedback in SETQ evaluations of residents. The first included the coding of narrative comments to investigate the frequency and determinants of narrative feedback with univariate and multivariate analysis. The second focused on developing literature-based coding schemes to code the suggestions for improvement followed by descriptive statistics. To investigate the effects of numerical and narrative feedback, and of participation in self-evaluation on subsequent teaching performance, we conducted a longitudinal cohort study in which we used multilevel analysis. In addition, we conducted a qualitative interview study guided by a comprehensive theoretical framework to describe and explain faculty’s (re)action after receiving feedback. Finally, we performed a critical appraisal of the literature followed by an expert discussion to identify the most practical strategies to make the best use of feedback.
**Table 1.** Research questions, study designs, and methods for each chapter

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