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Strategic choices in curriculum design to facilitate knowledge and competency development

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ONE

Introduction

COMPETENCY-BASED EDUCATION has become the foundation for many medical curricula all over the world.¹⁻¹⁰ Even though it has been a topic of discussion since the 1970s and 1980s,¹¹⁻¹⁶ over the past decade the concept has rapidly gained wide acceptance. Competency frameworks such as the CanMEDS, Tomorrow's doctor, the Scottish doctor and the ACGME general competencies framework have been implemented widely in both postgraduate and undergraduate education.^{1,17-21}

Competency-based medical education has been defined as “an approach to preparing physicians for practice that is fundamentally oriented to graduate outcome abilities and is organized around competencies derived from an analysis of societal and patient needs. It de-emphasizes time-based training and promises greater accountability, flexibility, and learner centeredness”.^{2,22} In short, it is an outcome-based approach to curriculum design using an organizing framework of competencies.² In this definition, competencies are defined as observable abilities students should develop, integrating multiple components such as knowledge, skills and behaviour.^{2,3,23,24} As such, competencies are student characteristics that should be defined clearly, unambiguously, and sufficiently general.^{3,23-25} Competencies should reflect the view and mission of a medical school's stakeholders, address predefined areas of competence and inform the learners about what is expected of them.^{3,24,26} Furthermore, competencies should reflect the ultimate goal of the curriculum and be formulated in terms of assessable behaviour.²⁴

The growing support for competency-based medical education

is associated with changes in society. A major impetus for the competency movement has been a widening call from society for more accountability and professionalism of medical schools and healthcare professionals.^{1,11,27,28} In competency-based medical education, it is clearly defined what is expected at the end of the curriculum. Ideally, only professional doctors and students who have mastered all necessary competencies will be able to pass the exams.²⁹ Consequently, competency-based medical education increases the accountability of medical schools. Furthermore, the developers of competency frameworks, such as the CanMEDS, specifically took into account the interests of nonmedical stakeholders like public organizations and patients.^{1,2,20} Competency-based education has been receiving increasing support from legislators and curriculum developers, since proper implementation warrants more accountability to and focus on the needs of society.^{1,9,22,30}

Another factor that facilitated the adoption and dissemination of competency-based medical education in Europe is the Bologna Declaration.³¹ The Bologna Declaration is a document that aims at European harmonisation of higher education in order to facilitate international student mobility and was signed by the ministers of education of the European Union member states. This agreement resulted in the Tuning Project, which aims to develop a framework of comparable learning outcomes as the basis for all undergraduate medical curricula in Europe.³²⁻³⁴ Competency-based education offers curriculum designers a way to achieve this goal, because it offers clear-cut guidelines for formulating learning outcomes.

Chapter 1

There is also an educational reason behind the widespread implementation of competency-based medical education. In traditional medical curricula, emphasis is mainly placed on knowledge acquisition, while skills and attitudes receive relatively less attention, even though the latter two are also highly relevant for doctors' performance in practice.^{2,35} Over the past decades, skills training for medical students has already been receiving much attention in many medical schools. This development is evidenced by an impressive body of research into learning skills through simulation and assessing clinical skills through tools such as the OSCE and the Mini-CEX.³⁶⁻⁴¹ Implementing competency-based education ensures that professional behaviour also receives sufficient attention and that a holistic approach is adopted to what makes a competent doctor.

A curriculum will be most effective when there is a structural alignment between its educational goals, the teaching formats and the assessment program.⁴² Therefore, curriculum design requires strategic choices to benefit student learning. Most of the literature about the implementation of competency-based education addresses educational goals.⁴³ These articles mainly focus on how to formulate learning outcomes and what competency-based medical education is expected to achieve. However, very little is known about which teaching formats and assessment methods are optimal for competency-based medical education, especially at the undergraduate level. In addition, it is unknown how changing the curriculum towards competency development influences its outcomes. For example, if considerable time of the medical curriculum is devoted to competency development,

how does this influence student learning and development? In former curricula the main focus was on the acquisition of basic knowledge and skills.^{2,35} How does the shift towards competency-based curricula impact students' knowledge and skills development? In this thesis some pieces of this puzzle are addressed.

OUTLINE OF THE THESIS

This thesis investigates the competency-based undergraduate medical curriculum that was implemented at the University of Groningen in 2003. More specifically, the research described in this thesis focuses on the effects of and risks associated with several strategic choices in curriculum design that aim to facilitate student knowledge and competency development.

In **Chapter 2** the design choices in a competency-based undergraduate curriculum and their educational effects are addressed. We investigated differences concerning three educational outcomes between the last two cohorts before and two cohorts after the implementation of a competency-based curriculum. We studied students' knowledge growth, clinical performance and perceived preparedness for practice.

Subsequently two lines of inquiry will be further explored, focussing on two specific strategic choices aimed to benefit competency development and knowledge development, respectively. The first line of inquiry concerns the clinical phase, at the end of which students have to fully master the required competencies for graduation. It has been suggested that longer clerkship rotations are a beneficial choice in curriculum design that should provide the optimal context for students to develop their competencies. Given the limited duration of the clinical

phase, longer rotations will lead to less variety in disciplines students rotate through. This raises the question whether variety of disciplines offers students specific educational benefits. Are there benefits associated with rotating through specific disciplines?

The study described in **Chapter 3** aimed to explore the suitability of various disciplines for students to master a set of prescribed competencies. First, a focus group of medical experts and students rated the suitability of 12 disciplines for students to master each of 177 competencies. Subsequently, we explored which clerkships could be considered as mandatory.

Rotating through specific disciplines, might influence students' knowledge about those disciplines. In **Chapter 4** we investigated how rotating through a certain discipline during clerkships affects students' discipline-specific knowledge, as measured by the Dutch interuniversity progress test. For five disciplines we compared students' discipline-specific knowledge before, during and after a clerkship and, if applicable, after a second clerkship in that discipline. Furthermore, we analysed to what extent discipline-specific knowledge declines from the moment a clerkship rotation in a specific discipline has ended.

The second line of inquiry regards how assessment can be strategically used to benefit students' knowledge development. Implementation of competency-based medical education means that competency development becomes a formal curricular goal. Often, this goal is added to the already existing goals of knowledge and skills development. A

likely consequence is that some of the former curriculum time aimed at knowledge development will be reserved for competency development in the new curriculum. Therefore, less time will be available for knowledge acquisition. This may become a problem, because medical knowledge plays a key role in developing medical expertise.⁴⁴⁻⁴⁶ Assessment may offer alternative means of supporting students' knowledge development. The central issue in our research is cumulative assessment. The purpose of cumulative assessment is to keep students studying by applying principles such as repeated testing, repetition of content and compensation among tests.

Chapter 5 presents our research into how cumulative assessment influences students' test scores throughout a 10-week course. We investigated two second-year courses and two third-year courses. We compared tests scores of initially low and initially high scoring students over the course, while correcting for regression to the mean and test difficulty.

In **Chapter 6** a random controlled study is described in which the difference between cumulative assessment and end-of-course assessment was investigated. We analysed self-study time students spent throughout a course and students' performance at the end of the course in two conditions, cumulative and end-of-block assessment. Furthermore, we measured how students perceived both assessment methods to influence their study behaviour.

Chapter 7 provides a brief summary of the main findings of this

thesis and includes a general discussion in which our findings are considered in the light of knowledge development and competency development in undergraduate medical education. We discuss several methodological considerations and implications for medical education practice. Suggestions are done for future research and the general direction of research on competency-based medical education.

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