FROM SMALL SPARK TO GREAT FIRE

Optimizing medical students' engagement in small-group active learning

Jan Willem Grijpma

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Optimizing medical students' engagement in small-group active learning

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CHAPTER 1

General introduction

Medical education is increasingly making use of active learning, recognizing its potential to enhance student learning (1–3). However, its implementation can be optimized. Faculty and students continue to struggle with integrating active learning into their teaching and learning practices, resulting in reduced effectiveness (4–6). Student engagement has been identified as a major contributor to active learning effectiveness, yet it has also been described as a complex process that can be difficult to influence (1,7,8). The aim of this thesis is to contribute to the implementation of active learning by advancing understanding of the student engagement process and the role that teachers can play in optimizing it.

To illustrate the potential and process of student engagement in active learning, I have titled this thesis 'from small spark to great fire'. It refers to the saying (from unknown origins and phrased in various ways): 'Education is not the filling of a bucket, but the lighting of a fire'. This saying captures how I approach my work. I strive to inspire and motivate the teachers and students I work with to develop their competencies: to light their fire. The title also holds promise. That great fires follow from small sparks, or in other words, optimal student engagement in the active learning process. Through the research conducted in this thesis, we will see whether that promise holds. Lastly, the saying is consistent with a constructivist view of learning, which I will elaborate on later in this introductory chapter.

To outline the following parts of this general introduction, I will first describe how this PhD started. Then, I will introduce the research topic and describe its implementation in medical education, followed by a description of this thesis's overarching aim and central research question. Next, I will contextualize the research and describe the methodological approach applied in the investigation of the topic. After that, I will provide some reflective thoughts about our approach. To conclude the chapter, I will provide an overview of the subsequent chapters.

Starting this PhD

After completing my studies in 2010, I began my career as a small-group teacher at a medical school. My role was to support medical students in developing their non-technical skills, such as communication, collaboration, and professionalism. All classes I taught incorporated at least some elements of active learning. I was both fascinated and frustrated by the differences I experienced between student groups. While some groups engaged easily with the content and with each other, others remained disengaged despite my best efforts. This discrepancy was particularly puzzling to me, as many factors were constant across those groups: they had the same teacher (me), employing the same teaching methods, in the same course, in groups with comparable student demographics and of equal sizes. This made me curious: what was causing these differences?

Moving ahead to the year 2018. I had taken the next step in my career by joining the Vrije Universiteit Amsterdam as a faculty developer. Here, I fully embraced the concept of active learning as an essential teaching and learning strategy in any study program. During

faculty development initiatives, I would often introduce this strategy to participating teachers. After discussing the concept, suggesting learning activities, and allowing teachers to experience active learning within the meetings, they typically decided to incorporate active learning into their own teaching. In subsequent meetings, teachers would share experiences and many reported clear improvements in student participation, as well as increased enjoyment of their teaching. However, this was not always the case. Despite adhering to recommended practices and repeated attempts, some teachers found that their students remained passive and detached from the learning process. As a result, the teachers felt that they had little choice but to fall back on familiar teaching and learning strategies that did not require interaction, such as lecturing.

These contrasting experiences of teachers triggered memories of my personal experiences and reignited my curiosity: what factors contribute to some teachers successfully adopting active learning and engaging students, while others encounter such difficulties? As a faculty developer, I was familiar with various facilitators and barriers that impact active learning, such as the influence of assessment methods, time constraints, group size, student resistance to active participation, class planning, and classroom infrastructure. Still, this knowledge did not provide sufficient answers to my questions or aid the teachers in my faculty development initiatives. This gap prompted me to delve deeper into this matter. Consequently, this thesis represents a means to offer more effective support to the teachers I work with.

Introducing active learning and student engagement

Active learning is an educational concept describing the process of students actively engaging with study materials through learning activities, and teachers serving as facilitators in the learning process by guiding students as they learn, practice, apply, and evaluate the subject matter (9–12). It is often positioned as the opposite of traditional or passive learning, where students mainly listen to an expert telling them what they should know. Underlying active learning is a constructivist theory of learning, which proposes that learning is an active process that requires learners to construct their own understanding (13,14). Students are not empty buckets to be filled with knowledge but are actively making sense of new information by relating it to prior knowledge and experiences (15). Reviews and meta-analyses on active learning in various fields demonstrate its superior effectiveness on student learning, compared to passive learning (11,16–18). Furthermore, the use of active learning has also been linked to outcomes such as enhanced student motivation, lower student dropout, shorter study duration, and more equitable outcomes for students from disadvantaged backgrounds (7,19–23).

A critical factor that directly influences the effectiveness of active learning is student engagement (1–3,24). Student engagement refers to the participation or involvement of students in a learning process. It is often conceptualized as a multidimensional construct, encompassing cognitive, emotional, and behavioral components (1,25). The cognitive

component refers to a student's investment in learning, willingness to put in effort, persevere through challenges, and the use of metacognitive strategies to stimulate their learning. The emotional component refers to a student's feelings about learning and the learning environment. Finally, the behavioral component refers to a student's conduct and their observable actions during learning (25). In other words, student engagement concerns what students think, feel, and do regarding the learning process (7). While engagement is characterized by positive cognitions, emotions, and behaviors, a student can also be disengaged, which is characterized by negative cognitions, emotions, and behaviors. Student disengagement refers to a student's detachment from the learning process (26). When disengaged, a student is not invested in their learning, does not experience positive affect towards their learning, and their actions do not contribute to learning. It is important to note that, although the three components are related, they can function independently. A student can remain disengaged on one component (such as behaviorally disengaged by not participating in class discussions), but become engaged on another component (such as cognitively engaged by thinking deeply about the course content) (27).

Despite a large body of research on student engagement, concerns have been raised about the conceptual haziness of the construct (28,29). To improve conceptual clarity, the Dual Component Framework of Student Engagement has been proposed, which defines learning engagement and school engagement as separate constructs under the broader concept of student engagement (29). In short, learning engagement is related to in- or out-of-class learning activities, while school engagement is related to the broader context of the school setting (and includes participating in clubs and identifying with a school). In this thesis, the term student engagement is used to describe the former.

Another attempt to improve the conceptual clarity of student engagement comes from the ICAP framework (30). According to this framework, it is useful to differentiate student engagement in distinct activities that allow teachers and researchers to observe and elicit specific modes of student involvement. The ICAP differentiates Interactive, Constructive, Active, and Passive learning modes. Students in an Interactive learning mode are collaboratively generating knowledge beyond the course material. It involves students working together to construct their knowledge, often through discussions or group problem-solving. The dialogue or interaction between students is key in this learning mode. Students in a Constructive learning mode also go beyond what was taught to them. However, in this learning mode, self-construction activities are key, such as by creating concept maps or asking questions. Students in an Active learning mode are physically active or manipulate something in the physical environment, such as gesturing, taking notes, or underlining text. There is no knowledge generation in this learning mode. Finally, students in a Passive learning mode pay attention and receive information, but do nothing with it. Examples include reading a text, watching a video, and listening to a lecture (8,30,31). In addition to differentiating student engagement, ICAP also predicts that, as students become more engaged with learning materials, their learning increases. In other words,

students learn more from Passive to Active to Constructive to Interactive. Empirical studies indeed provide support for this hypothesis (24,31,32).

Reflecting on the paragraphs above, and the picture that may appear from it, one might assume that the benefits of active learning are clear and undeniable. It might even seem that educators should feel morally obligated to implement active learning and possibly even eliminate methods that could be considered passive. However, before we proceed with this line of thought, it is important to make room for critical perspectives on active learning research. The following paragraphs will describe four critical perspectives.

First, the opposition of active and passive learning is not as black and white as it may appear (33). Usually, passive learning methods involve some active learning. In lectures, for example, teachers often ask questions or use digital tools to engage students at some point. Likewise, active learning methods usually include some form of passive learning or knowledge transmission. In a small-group learning setting such as case-based learning, for example, a teacher may explain material through a presentation. In fact, authors suggest that it may not be a question of whether to choose passive or active learning, but rather a question of how to combine them for optimal results (11,18,34).

Second, the specific implementation of active learning can vary greatly between studies, making it difficult to aggregate findings. While critically examining sources of variation, researchers have found that studies have compared different active learning methods, amount of in-class and out-of-class time spent on these methods, characteristics of students and teachers, educational settings, disciplines, dependent variables, designs, and methodologies (33,35). These variations may explain why studies have found mixed results in active learning effectiveness, even though meta-analyses report positive outcomes (11,16–18). Meta-analyses adeptly consolidate findings from individual research studies, offering a broad overview, but they are limited in taking into account the variables that can potentially affect the results and meaning of individual studies (35). One author therefore suggests moving from the question 'does active learning work' to 'which active learning methods taught by which instructors, in what kind of contexts and circumstances, lead to significant better learning results for which learners, and are these methods genuinely better than traditional [i.e., passive] methods?' (35). Other authors suggest that studies should not compare active with passive learning methods, but compare different types of active learning to identify appropriateness and effectiveness (11). Thus, how active learning is implemented and researched influences findings.

Third, student engagement is critical in an active learning process, but teachers may find it difficult to recognize in their classrooms. Behavioral engagement can be observed directly. However, this is not possible for cognitive and emotional engagement. They are internal processes. Therefore, they have to be inferred from behavioral cues. This is, at least partly, why teachers use these behavioral cues to assess if their students are engaged and why

the ICAP framework uses overt student behaviors to distinguish the four learning modes (31,36–38). In fact, one assumption of the ICAP framework is that student behavior is a good indicator of student engagement (8). However, critical questions have been raised about this. Verbal participation, for example, is an aspect of behavioral engagement and is typically seen as an indicator of student engagement (39,40). However, to show why this is not a reliable indicator, in one qualitative study, a student described speaking up in class just to get points without much effort (39). This motivation to get points without effort actually aligns with student disengagement. Therefore, being behaviorally active does not necessarily mean being cognitively active (36,41). And it seems that cognitive engagement has the strongest evidence linking it with academic achievement (1,25,30).

Fourth, and related to the previous point, student disengagement is common and limits the effectiveness of active learning (26,42). As active learning is typically collaborative in design, it requires students to work together to develop their understanding. When a student does not engage, or even displays disruptive behaviors, they not only reduce their own learning, they can negatively impact the learning of others (25). Factors influencing disengagement are related to both intrinsic and extrinsic factors, such as motivation, unmet expectations, stress, teaching factors, and factors related to the curriculum and institution (26,42,43). Some of these factors may be directly or indirectly under the control of a teacher or of a study program, others are not. This means that although student (dis)engagement can be targeted through interventions, their success is not guaranteed (7). Furthermore, teachers may need to develop their competencies in addressing student disengagement (4,44). One common reaction of teachers experiencing student disengagement is to fall back on more passive learning methods, like lecturing, to avoid such negative situations in the future (45).

To summarize, educational literature describes how active learning can be a more effective method to achieve desired student outcomes than passive learning. To be effective, it requires students to engage individually or collaboratively with the course material, preferably in a knowledge-generating way. However, educators should take four important criticisms into account: 1) active and passive learning combined might both be most effective in a learning process, 2) active learning implementation can vary, which affects its potential effectiveness, 3) designing engaging activities and identifying if students are engaged with the material can be difficult, and 4) student disengagement may be difficult to influence and limit the effectiveness of active learning. Thus, active learning can work, but how it is implemented matters.

Implementation of active learning in medical education

Active learning has been adopted and is increasingly becoming a cornerstone in medical education. The impact of curricular reforms to accommodate active learning is evident in the changing roles of both medical students and teachers within the learning process. Students are less perceived as consumers or clients and are increasingly recognized as partners. Simultaneously, teachers have transitioned from a focus on 'teaching' to a focus

on 'facilitating the learning of their students' (46–48). Active learning plays a central role in various educational strategies used in medical education, such as Problem-Based Learning (49–51), Case-Based Learning (52,53), and Team-Based Learning (54–56). Various commonly used methods, such as flipped classrooms (57), simulations (58), and peer teaching (59) also stimulate medical teachers to create learning environments in which students can engage with information and construct their understanding. The overall picture that emerges from medical education research into these strategies and methods aligns with the findings of educational research in other disciplines, supporting the effectiveness of active learning (1,2). However, despite the increased use and support of its effectiveness, medical students and teachers do not always appreciate active learning, nor have they learned to implement it consistently and successfully (5,60–63).

First, let us focus on the students' perspectives on active learning. Research on medical students shows that they understand the potential of active learning for their development and support its use in their training (44,60). One scoping review identified that students were generally willing to engage and that their engagement was enhanced in situations with positive student-peer and student-faculty relationships, a stronger sense of competency, and perceived relevance of learning activities (1). Therefore, it may come as a surprise that students can also be reluctant to engage in active learning methods. This reluctance seems to stem from perceptions that such methods may not be the most effective or efficient use of their study time (64,65). Students also seem to prefer some methods over others (66). Finally, when students perceive active learning to be poorly implemented and does not contribute to their goals, they are likely to resist engaging in it (42,44,60,61,67). Thus, it seems that although students generally appreciate active learning, there are factors that influence their engagement.

Now, let us focus on the teachers' perspectives on active learning. Teachers are pivotal in shaping active learning environments in which students want to engage. Their attitudes and competencies directly affect students' level of engagement in and out of class (8,44,62,68,69). Furthermore, they can serve as mediators for other factors that influence student engagement, such as student characteristics, cultural aspects, curriculum design, and other contextual elements (25,44,68,70,71). In practice, however, teachers have reported to lack the competencies and support needed to fulfill their roles as facilitators of learning successfully (6). Even experienced teachers with advanced knowledge and skills related to active learning have been reported to experience difficulties in engaging their students (5). Research using the ICAP framework has also shown that teachers experience difficulty designing the most engaging (i.e., Constructive and Interactive) activities (8). There is, therefore, an urgent need for teachers to improve their mastery in engaging students in active learning.

Finally, let us include a faculty development perspective on active learning. To assist teachers in developing the teaching competencies essential for active learning, faculty development

initiatives in medical education regularly address this topic (5,72). Research shows that faculty development can indeed develop relevant knowledge, skills, and attitudes of teachers (72–74). However, additional literature shows that it can be difficult for teachers to implement the lessons learned from these initiatives in their teaching practice (75). Various factors have been identified that contribute to this difficulty, such as that teachers may not receive the necessary time or support to apply their newly acquired competencies or that classrooms are not designed to accommodate active learning (5,76). Thus, even when teachers have mastered competencies related to active learning, other factors can hinder its implementation.

In conclusion, active learning has been adopted by medical education, leading to enhanced student learning. However, its implementation could be improved. To fully harness the benefits of active learning in medical education, it is imperative to delve deeper into the challenges of student engagement from the three perspectives described in this section. First, by investigating the students' perspectives on active learning: given that students generally appreciate active learning, but their engagement may vary, how can their engagement be optimized? Second, by investigating the teachers' perspectives: given their pivotal role in student engagement, which knowledge, skills, and attitudes are essential for engaging students in active learning methods? Third, by investigating a faculty development perspective: given that faculty development can be effective in developing teachers' competencies, how can the transfer of these competencies from training to practice be stimulated? By addressing the challenges highlighted here, we can fill knowledge gaps and medical teachers can better stimulate the learning of their students and prepare them for a future as healthcare professionals.

Overarching aim and central research question

The overarching aim of this thesis is to further enhance student learning in medical education through the implementation of active learning, focusing on student engagement in small-group learning settings. To this end, the central research question of this thesis is:

"How can medical teachers be supported in implementing small-group active learning into their teaching practices in such a way that student engagement is optimized?"

Context of the research

Medical education in the Netherlands starts with a three-year Bachelor's program, followed by a three-year Master's program (77). The programs are designed to meet the end qualifications outlined in a national framework (78). These end qualifications integrate knowledge, skills, and attitudes, and are aligned with the CanMEDS framework (79). The studies in this thesis were conducted in the Bachelor's phase of medical training at the Medical Faculty of the Vrije Universiteit Amsterdam.

At the start of their first year in this medical school, students join study groups consisting of a maximum of twelve students. These study groups, guided by a tutor, meet once or twice per week for two-hour sessions throughout a semester. The course follows a collaborative case-based learning approach in the first two years and shifts to a team-based learning approach in the third year. During these meetings, students discuss written patient cases and work on accompanying assignments designed to help them relate clinical signs and symptoms to underlying mechanisms. The meetings aim to integrate and apply the knowledge, skills, and attitudes gained in lectures, labs, and other meetings. Students are responsible for a range of roles, including chairing meetings, presenting findings, taking notes, and providing peer feedback. They also collaborate between meetings to prepare presentations and work on cases. In the third year, the focus shifts to clinical reasoning skills to prepare students for their roles as interns in the subsequent year. Tutors serve as facilitators during study group meetings, guiding the learning process rather than acting as content experts. Their main tasks are to observe individual contributions, give feedback on professional behavior and personal competencies, and support students' professional development. In the final year of the bachelor program, tutors are required to have a medical background given its focus on preparing students for the clinical phase of their training. Tutors in earlier years have various backgrounds; some have a medical background, while others come from research or para- or nonmedical fields.

The work of this PhD began in 2018, with two studies conducted in a face-to-face manner. The tutoring course at this time was also designed to be conducted face-to-face. Then, the course switched to an online or mixed format from March 2020 to January 2022 due to the COVID-19 pandemic. The third study was conducted online at this time. However, because of the nature of our research question and aim, the last studies were postponed until face-to-face education was possible again.

Methodological approach

Just as active learning is based on a constructivist theory of learning, we believed that the central research question required a constructivist approach to study it (although our last study also adopted pragmatism to combine qualitative with quantitative data) (80). Constructivist research is characterized by methods that aim to understand events and processes and the processes by which individuals construct meaning from them (81,82). Knowledge and reality are subjective and result from multiple, diverse, and personal interpretations. Constructivist research mainly relies on qualitative methods, although mixed methods can be used when quantitative data is used to gain a more comprehensive understanding of the researched events and processes.

In this thesis, a combination of qualitative and mixed-method research designs was used to explore the topic of active learning from three perspectives. Specifically, stimulated recall and constructivist grounded theory were the qualitative methods used, while q-methodology and design-based research constituted the mixed-method approaches. Through this varied

methodological framework, combined with the three perspectives we studied, a rich answer to the central research question could be obtained.

Reflexivity

Given that knowledge is subjective in constructivism and understanding is actively constructed between researchers and participants, reflexivity is an important aspect of qualitative research (83).

From the start of this PhD, I had extensive knowledge of active learning and believed that improved implementation of it in medical education would benefit both teachers and students. Therefore, I always collaboratively conducted the research and analyses, kept audit trails, considered multiple interpretations, and regularly discussed findings at various stages with the author team. I had many years of experience working as a teacher in medical education and as a faculty developer working with medical teachers. At the time of this research, I had no (hierarchical) relationships with participants in the studies, nor with the context in which the research was conducted. This ensured that I could use my professional experience and personal curiosity to inform the studies without potential organizational pressure. The other members of the research team were a mix of educational and healthcare professionals: an assistant-professor with a background in linguistics, teaching, and faculty development, a professor of Health Professions Education with a medical background and involved in teaching medical students, and a professor of Educational Sciences with a psychological background. For each study, we deliberately sought collaborations to strengthen the author team. The diversity in the team contributed to rich discussions and new insights.

Overview of chapters

To answer the central research question and achieve our aim of contributing to active learning implementation in medical education, we will study the knowledge gaps from the three perspectives outlined above: students, teachers, and faculty development.

We will focus first on the students' perspectives. Although students generally appreciate active learning, there are factors that influence their engagement. Furthermore, their engagement might be difficult to recognize and influence. Understanding exactly when students appreciate active learning and what they need to stimulate their engagement is the first step we will take (Chapters 2, 3, and 4).

Then, we will shift our focus to the teachers' perspectives. Teachers play an important role in creating learning environments in which students can engage to construct their understanding, but teachers may need to master specific competencies before they can claim that role more effectively. Understanding which competencies are essential for engaging students in an active learning setting is the second step we will take (Chapter 5).

Finally, we will delve deeper into a faculty development perspective. Faculty development initiatives can support teachers in their development, and we can use the information from previous studies to better prepare teachers to teach in engaging ways. However, the transfer from training to practice may pose a problem. Understanding how teachers can be stimulated to apply the active learning competencies they mastered to their teaching practice is our final step (Chapter 6).

Table 1.1 presents an overview of each study's research questions, along with their respective methods, data sources, and analytical approaches.

Table 1.1. Overview of the empirical studies in this thesis

Chapter	Research Question	Method	Data Source	Analysis
2	When and why do medical students appreciate small-group active learning?	Q-methodology	Physical Q-sorting procedure and semi-structured interviews with students	Centroid method of factor analysis with Varimax rotation (quantitative), analyzed concurrently with interview data (qualitative)
3	How and why does student appreciation of small-group active learning change during the Bachelor program?	Q-methodology	Online Q-sorting procedure and open-ended questions	Centroid method of factor analysis with Varimax rotation (quantitative), analyzed concurrently with interview data (qualitative)
			Online semi-structured interviews with students	Conventional content analysis

Table 1.1. Overview of the empirical studies in this thesis (continued)

Chapter	Research Question	Method	Data Source	Analysis
4	1) How do the three dimensions of student engagement interrelate in a classroom setting? 2) How do antecedents of student engagement influence student engagement in class? 3) How can the multidimensional view of student engagement help us to understand why it can be difficult for teachers to engage their students?	Stimulated recall	Semi-structured interviews with students	Template analysis
5	How do expert medical teachers stimulate high levels of student engagement in small-group active learning sessions?	Constructivist grounded theory	Semi-structured interviews with teachers	Iterative data analysis using constant comparison
6	How can a Faculty Development Initiative, aimed at enhancing medical teachers' competencies in facilitating small-group active learning, be designed so that transfer is stimulated?	Design-based research	Observations of meetings Surveys and semi-structured interviews with teachers	Descriptive statistics (quantitative) and Directed content analysis (qualitative)

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CHAPTER 2

Appreciating small-group active learning: what do medical students want, and why? A q-methodology study

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ABSTRACT

Introduction

For Small-Group Active Learning (SMAL) to be effective, students need to engage meaningfully in learning activities to construct their knowledge. Teachers have difficulty in engaging their students in this process. To improve engagement, we aimed to identify the diversity in medical students' appreciation of SMAL, using the concepts of epistemic beliefs and approaches to learning.

Method

Q-methodology is a mixed-method research design used for the systematic study of subjectivity. We developed a set of 54 statements on active learning methods. In individual interviews, first-year medical students rank ordered their agreement with these statements and explained their reasons. Data were analyzed using a by-person factor analysis to group participants with shared viewpoints.

Results

A four-factor solution (i.e., profiles) fit the data collected from 52 students best and explained 52% of the variance. Each profile describes a shared viewpoint on SMAL. We characterized the profiles as 'understanding-oriented', 'assessment-oriented', 'group-oriented', and 'practice-oriented'.

Discussion

The four profiles describe how and why students differ in their appreciation of SMAL. Teachers can use the profiles to make better-informed decisions when designing and teaching their SMAL classes, by relating to students' epistemic beliefs, and approaches to learning. This may improve student motivation and engagement for SMAL.

INTRODUCTION

Small-group active learning methods are effective in developing students' knowledge, skills, and personal and professional attributes (1–3). They are therefore an important component of many medical programs, and medical students increasingly spend their contact time in small-group settings (4,5). To be effective, active learning methods require students to engage meaningfully in learning activities to construct their own knowledge (6). Students, however, can be reluctant to engage as they feel that these methods are not an effective or efficient use of their study time (7). Consequently, active learning becomes a source of negative emotions, like frustration and anxiety (8), as well as a reason for students to complain (9). In addition, teachers who perceive their students to resist active learning methods might be unable or unwilling to use these methods, and revert to less effective (i.e., more passive) learning methods, like lecturing, that require little student engagement (6, 9–11).

Although (medical) education research has identified many factors that influence students' appreciation of active learning methods, these mainly focus on aspects of curricula, courses, teacher behaviors, and student sociodemographic characteristics (1,7,8,12,13). Only recently have researchers begun to investigate the student's perspective more deeply in an attempt to explain their continued reluctance towards active learning (7,14). These studies suggest that student appreciation of active learning is not a 'one-size-fits-all' issue. Because students have different beliefs about knowledge and learning, strive for different goals, and employ different learning strategies, they appreciate active learning differently. We need a better understanding of students' diversity in appreciation of active learning to help teachers to improve all students' motivation for these types of learning activities.

Two conceptual frameworks help us to investigate students' diversity in perception of active learning. *Epistemic beliefs* are beliefs about the nature of knowledge and the process of learning. Students have different beliefs about how to obtain, perceive, organize, and use knowledge (15,16). Perry's model of intellectual and moral development describes different stages students can be at, ranging from dualist beliefs (black-and-white thinking: there is one correct answer to everything, students need to memorize these answers), to multiplistic beliefs (problems can have multiple answers and even when contradicting each other, all answers can be correct, knowledge is subjective), to relativistic beliefs (some answers are better than others, depending on your stance or context), to committed beliefs (using personal values to evaluate answers)(16,17). Relating epistemic beliefs to active learning; students in the dualistic stage appreciate teaching and learning activities that will help them to obtain the clear-cut correct answer to questions, while later stages are more open for activities that allow multiple answers to question to coexist, or even activities that allow students to conclude different answers.

Approaches to learning is a related concept and identifies the motives (i.e., goals) and strategies of students for learning. Traditionally, a deep and surface approach were distinguished (18,19). A deep learning approach indicates a student's motive for meaningful understanding and the use of associated learning strategies like relating new knowledge to prior knowledge. A surface learning approach indicates a motive of meeting minimal requirements and relying on rote memorization strategies. Nowadays, an additional strategic learning approach is distinguished, indicated by a student's motive of high achievement, and use of both deep and surface learning strategies. Relating approaches to learning to active learning: surface learners favor subject-matter experts to tell them what they should know. Deep learners favor activities that allow them to use higher order thinking skills. Both epistemic beliefs and approaches to learning affect how students perceive and value active learning methods, which in turn affects how willingly students engage in active learning methods (20).

In this study, we aimed to identify the diversity in medical students' appreciation of small-group active learning, based on their epistemic beliefs and approaches to learning. Ultimately, this knowledge may help teachers to improve engagement in active learning in their classes by tailoring to different needs and wishes. Teachers can make better-informed decisions about specific learning activities, and communicate their value in relation to students' epistemic beliefs and approaches to learning.

METHOD

Setting

We conducted this study at the Faculty of Medicine of the Vrije Universiteit Amsterdam (FMVU) in the Netherlands. Medical education in the Netherlands is competency-based (derived from the CanMEDS framework) and consists of three years of preclinical education (Bachelor's degree program) followed by three years of clinical education (Master's degree program) (21). The FMVU has approximately 2300 students studying in the Bachelor and Master programs.

This study took place in the Bachelor phase of medical training. At the start of their first year, students enroll in study groups of twelve students. These groups are formed for a semester and meet twice per week for two hours to discuss written patient cases and work on accompanying assignments (designed to help students relate clinical signs and symptoms to underlying mechanisms). There are fifty-four meetings spread out over the academic year. Students themselves are responsible for preparing and leading the meetings, taking notes, asking and answering questions, giving presentations, and providing each other with feedback. Students collaborate between meetings to work on the cases and prepare the presentations. Teachers (called tutors) take on the role of facilitators during study group meetings; they focus on the process of the meeting and observe individual contributions to the learning process of the group. They also assess the professional behavior of students

at the end of a semester. Some tutors have a medical background, but this is not a necessity as the tutors do not have to function as content experts.

Study design

Q-methodology

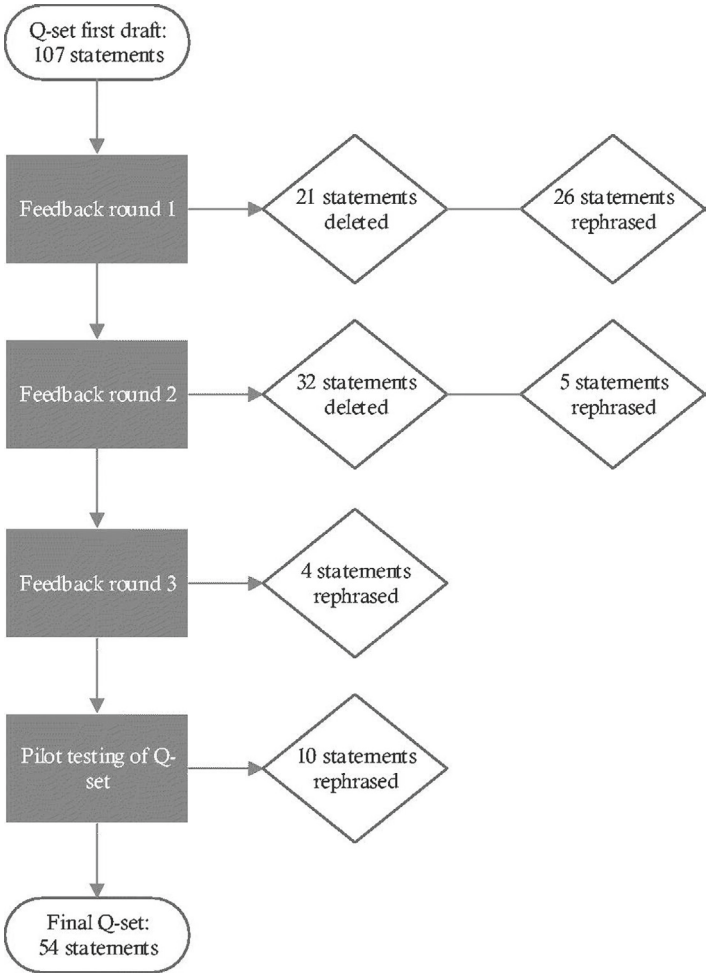
We used Q-methodology for this study. Q-methodology is a mixed-method research technique used for the systematic study of subjective viewpoints (22–24). It allows researchers to obtain a rich and differentiated understanding of participants' perspectives of the topic under study (25,26). This aligns perfectly with the aim of this study. Q-methodology has been used in (medical) education research before, for example to understand graduate medical trainee's attitudes towards teaching (27), to inform curricular change (28), and to elicit student attitudes towards their studies (29). Other aspects of education that have been studied using Q-methodology are e-learning (30), assessment (31), and self-regulated learning (32). Following the guidelines provided by Watts and Stenner (2012), we set up this study in five steps: 1) Q-set development, 2) participant selection, 3) data collection (Q-sorting), 4) data analysis, and 5) factor interpretation. These steps are described below in detail.

Step 1: Q-set development

The Q-set, or the set of statements about the research topic, was specifically developed and tailored to our research questions to cover all possible viewpoints (Figure 2.1). For our first draft, we reviewed relevant literature (on active learning, epistemic beliefs, approaches to learning), the medical school's educational policy documents, and student evaluation forms of the study group meetings in previous years. We also observed study group meetings and interviewed various stakeholders. As a result of this work, we developed statements in four categories: preferred roles and responsibilities of the students themselves (in- and out of class), their study group, their tutor, and expectations from their medical school.

Then, we revised the Q-set through three rounds of feedback. In round 1, we asked two educational professionals and two researchers to review the statements, using a think-aloud procedure. This allowed us to delete or rephrase unclear statements. In round 2, the research team then assessed the relevance, phrasing, overlap, and completeness of the Q-set. In round 3, we discussed the Q-set with other researchers from the Research in Education team of FMVU. Finally, we pilot tested our Q-set with the study group coordinator, two tutors, and two students. We again used a think-aloud procedure to assess the clarity of the statements. The final Q-set consisted of 54 statements (Table 2.1), which aligns with general recommendations to stay between 40 and 60 statements (24). For publication purposes, we translated the original statements into English (and checked our translation using back-translation by a native English speaker with Dutch fluency).

Figure 2.1. Process of Q-set development



Step 2: Participant selection

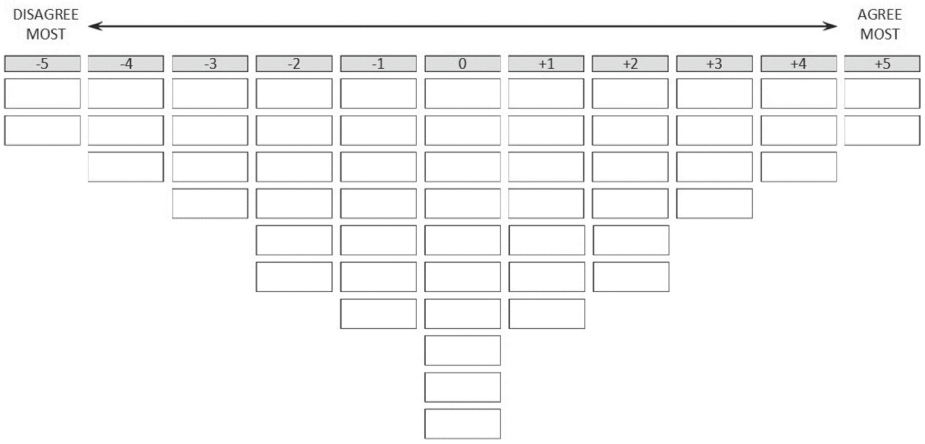
The selection of participants is important in Q-methodology, as researchers want to explore (or demonstrate) the existence of viewpoints. Watts and Stenner (24), therefore, recommend thinking critically about which sampling strategies will help to achieve that goal and determine relevant sociodemographic criteria. We chose to use a variety of strategies, as different students might be responsive to different strategies, thus increasing our chances of including as many viewpoints as possible. We invited students to participate during the opening lecture for first-year medical students, we went to their study group meetings, sent out an email to all first-year students, and distributed leaflets on the campus. We also invited students to ask a peer to participate; someone who they thought would have an interesting perspective (snowballing). In our communication we stressed that we aimed to

include students with varied preferences and that all preferences would be valued, especially students who feel they might have distinct preferences.

Q-methodological studies do not benefit from large numbers of participants, mainly because they are interested in establishing the existence of viewpoints in their sample, which theoretically can be achieved with as many participants as there are viewpoints. That is why the sampling procedure is so important. A general guideline is to include fewer participants than items in the Q-set (24). Therefore, we aimed to include 50 students in the study.
All first-year bachelor's students (N = 350) of FMVU were eligible to participate, as we aimed to identify the diversity in appreciation for active learning of students who enter medical schools. All students willing to participate were included.

Step 3: Data collection
We collected the data for this study between September and December 2018. Participants took part in a one-hour interview (with JWG, AdlC, or research assistant) on the campus. Before the interview, students were informed about the goals and methods of the study, could ask questions, and signed the informed consent form. At the beginning of the interview, participants filled out a questionnaire about their sociodemographic characteristics (age, gender, educational background, marital status, student member association, amount of volunteer or paid work, socioeconomic status, ethnic background, living situation). Then they did the Q-sorting procedure: rank ordering the Q-set statements according to agreement on a grid with a prearranged frequency distribution (Figure 2.2). The interviewer observed this process and photographed the completed Q-sort for quantitative analysis (see step 4). Next, the interviewer asked participants to elaborate on the reasons behind their choices (e.g., could you tell me your reasons for putting these statements at 'agree most'?). The interviewer also asked about observed behaviors during the Q-sorting process (e.g., when a student hesitated before placing a statement on the grid or laughed when reading a statement). These observations might indicate important thoughts and feelings about statements. Answers to these questions were written down on a blank piece of paper. This semi-structured 'post-sorting interview' comprised the qualitative data for this study. In Q-methodological studies, these data are not recorded, transcribed, and analyzed, as in qualitative methods, but used to evaluate factor solutions (step 4) and to enrich factor interpretations (step 5).

Figure 2.2. Grid showing the prearranged frequency distribution for the Q-sorting process



Step 4: Data analysis

We used PQMethod version 2.35 to perform factor analysis on the Q-sorts (33). PQMethod is a software program specifically developed for performing by-person (instead of by-item) factor analyses in Q-methodological studies. In line with Watts and Stenner's recommendations (24), we employed the centroid method of factor analyses, with varimax rotation, complemented with manual rotations. The centroid method leaves researchers "... free to consider any data set from a variety of perspectives, before selecting the rotated solution which they consider to be the most appropriate and theoretically informative" (34). This method suited our aim to include as many students in the factors as possible. Other methods, like principal component analysis, do not offer this freedom as they prescribe on statistical criteria alone which one solution to accept (35). This is also the reason for complementing the varimax rotation with manual rotations, to evaluate if we could add extra students to a factor.

Three researchers (JWG, AdlC, RK) evaluated the outcomes of the factor analyses (i.e., factor solutions) and decided on the accepted solution through consensus. Our criteria for accepting a solution were statistical (eigenvalues of >1.00, minimal total explained variance of 35%, and at least 2 Q-sorts per factor), qualitative (corroboration of the factor solution by the post-sorting interview data), and methodological (are the factors coherent, differentiated and recognizable) (24). As a final step, we used the study's conceptual framework to characterize the profiles.

Step 5: Factor interpretation

We followed the structured method for factor interpretation provided by Watts and Stenner (24). We started with the calculation of factor arrays (weighted averages of the Q-sorts in a factor, see Table 2.1). Factor arrays show how a prototypical student in a factor would

rank order the statements. We then interpreted the factor by looking at the highest and lowest ranking statements, statements in a factor that significantly deviated from other factors, and finally at items in the middle. At this point, we combined the quantitative and qualitative data, to enrich the factor interpretation and to explain any existing intra-factor discrepancies. Finally, we wrote up a description of each factor and checked its accuracy.

Ethics

The Ethical Review Board of the Netherlands Association for Medical Education approved the study (dossier number 1062).

RESULTS

Participant characteristics

Fifty-two first-year medical students participated in an interview between September and December. This means that students had between 1 and 3 months experience with the study group meetings. Forty-one participants were female. Their mean age was 18.6 years, with a range of 17–23. Seventy-one percent immediately enrolled in medical school following high school graduation (students without previous studies or gap years). These findings are roughly representative for the first-year medical student population of FMVU.

Student profiles

We decided on a four-factor solution using our criteria for evaluating factor solutions (see step 5 above). Each factor represents a group of students with similar viewpoints about small-group active learning. Table 2.1 shows the Q-set statements, with the factor arrays (how a prototypical student in a factor would rank order the statements). The four factors explained 52% of the study variance. Forty-seven Q-sorts loaded significantly on one of the factors, one Q-sort was confounded (loaded on more than one factor), and four Q-sorts did not load on any factor (Table 2.2). There were no significant correlations between the factors and the sociodemographic characteristics of the participants. As the factors represent students and not items (like in other factor analysis), we will use the word 'profile' instead of factor in the rest of the paper. The four profiles are summarized in Table 2.3. The descriptions below provide the subjective viewpoints of students in the profiles. The information in parentheses (e.g., 50 +4) refers to the specific statement number in the Q-set (between 1 and 54), and its position in the factor array (between -5 and +5).

Table 2.1. Q-set statements and factor arrays (i.e., how a prototypical student in a factor would rank order the statements).

		Factor array			
No.	**Statement**	**1**	**2**	**3**	**4**
1	I wish for a tutor who is an inspiring example (role model)	-1	-2	-4	-3
2	The tutor should bring in and discuss their personal experiences	0	0	-2	-2
3	If a topic is interesting, I do not mind when study group meetings run late	+1	0	-2	+1
4	I would like to get to know the tutor personally	-2	-2	-3	-4
5	Study groups should contribute to the development of friendships	-2	-1	0	+1
6	The tutor should respond quickly to students' emails	-1	0	0	0
7	The tutor should ensure that we understand the clinical aspects of study assignments in particular	0	+2	-1	-2
8	The tutor should assess the quality of my assignments	-3	+1	-3	-2
9	I find it frustrating having to collaborate with other students	-5	-5	-5	-4
10	I prefer collaborating with students whose viewpoints differ from mine	-1	-3	-1	0
11	The tutor should be available for students' study-related problems	+1	+4	+2	0
12	The tutor should be available for students' personal problems	0	+4	+3	-3
13	If there are problems in my study group, we should solve them on our own	+2	0	+3	0
14	I prefer to not have any difficult study assignments	-5	-2	-3	-5
15	I prefer collaborating with as many different students as possible	-1	-1	0	+1
16	The tutor should give me useful feedback	+3	+3	+4	+3
17	The tutor should give me compliments regularly	-3	-3	-3	-4
18	I like to receive a lot of feedback from the students in my study group	0	0	+1	+2
19	Feeling heard during study group meetings is important to me	+3	+1	+2	+2
20	Study group meetings should be well-structured	0	+1	+1	0
21	The tutor should show an interest in how I am doing and how the study group is doing	+1	+1	+2	0
22	The tutor should be able to explain clearly	+1	+2	0	+2
23	All students should be well-prepared for the study group meetings	0	-2	-1	-1
24	I think it is important to evaluate our group process	0	-1	0	0

Table 2.1. Q-set statements and factor arrays (i.e., how a prototypical student in a factor would rank order the statements). (continued)

		Factor array			
No.	**Statement**	**1**	**2**	**3**	**4**
25	Study group meetings should prepare us for the exams	+1	+5	+4	+3
26	I prefer that the tutor motivates me to find answers to questions, rather than giving me the answer	+3	-4	+1	-1
27	The tutor should motivate my study group to start working on assignments and to stay focused	-2	-1	-1	-1
28	I think it is important that all students in my study group feel free to express their thoughts	+5	+4	+5	+5
29	I dislike it when questions get discussed superficially	+2	-1	-1	+1
30	IT (digital/online possibilities) is an essential aspect of the learning process for me	-1	0	-1	+1
31	The tutor should have a sense of humor	-2	-1	-1	-2
32	The tutor should manage the group during study group meetings	-4	-2	-2	-1
33	I think it is important that all students actively contribute to study group meetings	+3	0	+1	+1
34	The study assignments should have a clear link with clinical practice	0	0	+2	+2
35	Study assignments should have a clear right or wrong answer	-3	+2	-2	-1
36	The tutor should tell me exactly what to do and when to do it	-4	-3	-5	-5
37	The tutor needs to have studied medicine	+2	+5	-4	-1
38	It is important to me that all students perform their tasks well	+2	+2	+3	+2
39	I prefer lectures over study group meetings	-4	+1	-2	-1
40	I wish to have the same tutor for as long as possible	-2	-4	0	-2
41	The tutor should take students' individual needs into account	0	+2	0	0
42	The tutor should have an understanding for the life of students besides their studies	-1	+3	+1	0
43	As a study group we should be able to decide how we want to collaborate	0	0	+2	+1
44	I think it is important to be challenged to learn	+5	+1	0	+4
45	I think it is important that there is variation in study group meetings	+2	0	+2	+2
46	The tutor should have high expectations of me	-1	-4	-4	-3
47	The tutor should coach study groups with passion	+2	-1	0	0

Table 2.1. Q-set statements and factor arrays (i.e., how a prototypical student in a factor would rank order the statements). (continued)

		Factor array			
No.	**Statement**	**1**	**2**	**3**	**4**
48	It is important to me that my study group has a good atmosphere	+4	+3	+5	+5
49	I want to be able to deepen my knowledge on topics that I find interesting	+1	+1	+1	+3
50	Study assignments and study group meetings should prepare me for more than only treating patients	+4	-2	+4	+3
51	The tutor should focus mainly on the process of learning, and should not interfere with the content	-3	-5	0	-3
52	I think it is important to learn how to analyze and solve problems	+4	+3	+3	+4
53	The tutor should be able to answer questions about the entire medical program	-2	+2	-2	-2
54	Study assignments and study group meetings should contribute to my development as a person	+1	-3	+1	+4

Reading this table by column shows how a prototypical student in a factor would rank order the statements on the grid (Figure 2.2). Reading this table by row shows cross-factor rankings. The numbers ranging from –5 to +5 correspond to the location on the grid (Figure 2.2). Scores at the end of the spectrum indicate stronger (dis)agreement with a statement.

Table 2.2. Q-sorts defining the four factors.

Factor	Loading Q-sorts	Number of Q-sorts	Eigen values	% explained variance
1	1, 4, 5, 6, 15, 16, 17, 25, 41, 42, 46, 47, 48, 51, 52	15	21.27	16
2	2, 19, 21, 24, 27, 33, 39, 50	8	2.64	11
3	7, 11, 13, 22, 30, 31, 34, 35, 40, 49	10	1.76	13
4	3, 8, 9, 10, 12, 14, 20, 23, 26, 28, 32, 36, 43, 45	14	1.50	13

Table 2.3. Summary of the four profiles.

	Profile 1 Understanding-oriented	**Profile 2** Assessment-oriented	**Profile 3** Group-oriented	**Profile 4** Practice-oriented
Role of students	Develop a deep understanding of all aspects of medicine	Learn what has to be learned for the assessments	Contribute to good atmosphere in study group, and engage with peers on content	Prepare for future career in clinical practice
Role of study group	Opportunity to learn from other students' perspectives	Ask questions and improve understanding of the content	Social network (friends), and social support system	Learn collaboration skills needed as a doctor
Role of tutor	Motivate students to engage with study material and challenge them to find their own answers	Explain the content as a subject matter expert, and be available in case of study delays	Observe group process, and give feedback on long-term development of students	Start group process, then make themselves obsolete
Role of medical school	Offer stimulating cases to challenge students	Match study assignments with the assessments	Provide trust and autonomy to study groups	Offer tailored practice opportunities

Profile 1: Understanding-oriented students
Profile 1 explains 16% of the study variance. Fifteen students load significantly onto this factor.

Role of students
Students in profile 1 are intrinsically motivated to broaden and deepen their understanding of everything related to medicine. They want to be challenged via questions, problems, and discussions with others (44 +5). Becoming a good doctor is more important to them than passing exams (25 +1). They are motivated by learning how to analyze and solve all sorts of problems (52 +4). They view themselves as mature learners and accordingly want to be responsible for their own learning, including learning from their own mistakes (36 -4, 46 -1).

Role of study groups
Students in profile 1 value working together with their peers in study groups (9 -5). For optimal learning, they feel it is the responsibility of all members to do their assignments well and to participate in the learning process (23 0, 33 +3). Members of the study group should not let other activities in their lives interfere with their responsibility to the learning of the group (42 -1). Study groups should ensure that all members feel safe to say what they think, as that provides an extra opportunity to learn from multiple perspectives (28 +5, 48 +4). Students in this profile prioritize learning over the social aspect of study groups (5 -2). Study group meetings can be tailored to students' wants and needs, making them preferable over large-group lectures (39 -4). As students in this profile value in-depth discussions (29 +2), they do not mind when group meetings run late (3 +1).

Role of tutors
Tutors' main task is to motivate students to engage with the material, and challenge them to find their own answers. In fact, tutors should refrain from giving answers as this limits learning (26 +3). Tutors should be passionate, as this motivates students (47 +2). Their role is to facilitate, and not control, the process (32 -4, 1 -1). Tutors do need to have some medical knowledge to facilitate the learning (e.g., by knowing which questions to ask) (37 +2, 51 -3).

Role of medical school
Medical training should challenge students to learn about the social, ethical, and research side of medicine, and not only be about treating patients (50 +4). There should be space for multiple viewpoints and discussions (34 0, 35 -3, 14 -5). Schools should also develop a system in which students themselves are responsible for learning, which allows making mistakes as part of learning, and that provides trust and autonomy to students to learn in their own way (8 -3).

Profile 2: Assessment-oriented students
Profile 2 explains 11% of the study variance. Eight students load significantly onto this factor.

Role of students
For students in profile 2, the goal is to pass exams. All educational activities should help with this goal (25 +5). This means that they want to learn what the 'right and wrong' answers are, and they feel frustrated when there is no such answer (35 +2). They are looking for efficiency in learning, and are therefore not interested in anything other than what is being assessed (54 -3).

Role of study groups
Students value collaboration with peers, because it allows them to ask questions and improve their understanding of assessment-related knowledge (9 -5). Therefore, all students in a group should feel free to ask any questions they have (28 +4) and there should be a good atmosphere (48 +3). However, study groups consisting of students voicing diverse perspectives complicates learning, as it is then difficult to conclude correct answers. Groups of like-minded students are preferable (10 -3). A diverse group can have more intragroup friction and miscommunication, which costs time and distracts from learning (48 +3, 24 -1).

Role of tutors
Tutors' main task is to make sure that students understand the content correctly (51 -5). Hence, tutors should have studied medicine (37 +5) and explain the content clearly (7 +2, 22 +2). They should answer questions rather than challenging students to find their own answers (26 -4). They should also check the quality of students' assignments (8 +1). Furthermore, tutors should be available for (study-related and personal) problems that might interfere with their goal of passing exams (11 +4, 12 +4, 41 +2, 42 +3). Students in this profile do not have the desire for a personal connection with their tutor (40 -4), nor do they expect passion from tutors in facilitating study groups (47 -1). To help with students' study efforts, tutors should know everything about the study program (53 +2). Finally, tutors should not have high expectations for students, as this might mean students have to work harder for a passing grade (46 -4).

Role of medical school
The medical school should design the study groups in such a way that they optimally support students in preparing for the exams (25 +5). Lectures, in which students can learn from experts, are actually preferred over study groups, as students immediately learn the correct understanding of a topic (39 +1). Study assignments should not be too challenging (14 -2). The focus of the program should lie on clinical content knowledge, rather than personal development and a broader perspective on patient care (50 -2, 54 -3).

Profile 3: Group-oriented students
Profile 3 explains 13% of the study variance. Ten students load significantly onto this factor.

Role of students
For students in profile 3 learning how to collaborate with others is most important, as they see this as an essential skill for any future career. Groups also fulfill important needs for students, like a sense of belonging, support, opportunities for new friendships, and learning. They, therefore, want to contribute to a good group atmosphere (48 +5). They believe that the best way to learn medical topics is by discussing and relating their ideas with those of their peers (39 -2). They believe learning occurs in dialogue, and that it is important to develop their own opinions by relating to those of others (28 +5).

Role of study groups
Students feel they gain new insights by discussing and explaining to each other, and see opportunities to build their social network (making friends) by collaborating (9 -5). Students see the group as a support system as well, and being friends with one another can stimulate well-being, enjoyment, and study success. Study groups should be responsible for the learning process. In doing so, they practice collaboration skills needed in any future career. Therefore, they should have autonomy in deciding how to collaborate (36 -5, 43 +2). They should also be able to solve any intra-group problems themselves (13 +3). Essential ingredients are inclusive atmospheres (48 +5), and equality among members (28 +5).

Role of tutors
Tutors are not the same as teachers, as tutors do not need to explain any content (22 0). Tutors do not have to be role models who discuss their own experiences, nor do they have to have studied medicine (1 -4, 2 -2, 37 -4). Their role is to observe and guide the group process, and give feedback to students on their long-term development (16 +4). Tutor feedback is seen as more valuable than peer feedback because a tutor can be more critical – this includes addressing students' disruptive behaviors should these occur. They should be available for discussing students' personal problems (12 +3).

Role of medical school
Medical schools should design study groups to serve multiple purposes: they should help students to prepare for exams (25 +4), to learn communication and collaboration skills (50 +4), and to build a social support network. The medical school should provide clear boundaries within which autonomy is given to groups. Assignments should be clearly linked to practice, to increase motivation and getting a good overview of the profession (34 +2).

Profile 4: Practice-oriented students
Profile 4 explains 13% of the study variance. Fourteen students load significantly onto this factor.

Role of students
Students in profile 4 want to learn to think like a doctor. They want to learn how to analyze and solve problems (52 +4). They view 'struggling' with complex and challenging assignments as a necessary and enjoyable aspect of learning, as this allows them to construct their knowledge (14 -5, 44 +4) and to prepare for a future in clinical practice. If they are not sufficiently challenged, they get bored and demotivated. They are interested in learning about all the roles and responsibilities they will fulfill, including personal and professional development (52 +4, 54 +4). Students want to be responsible for both the learning process and achieving the desired learning outcomes (36 -5).

Role of study groups
Students like to collaborate with peers who think differently from themselves (9 -4, 10 0, 15 +1), as their perspectives are opportunities for rich feedback (18 +2). Students in this profile see the process of collaboration as preparation for their future careers in multidisciplinary teams. An open and safe group atmosphere is important so that all students feel free to say what they want (48 +5, 28 +5). Study groups are also an opportunity to develop friendships (5 +1).

Role of tutors
Tutors' main task is to stimulate group collaboration at the start, and then to minimize their activity and ultimately 'become obsolete'. Students feel they should be able to manage themselves, as they will not have anyone holding their hand when they are a doctor. Tutors do not have to share personal experiences or explain the content (2 -2, 7 -2). Students in this profile do not need tutors for personal and study-related problems (11 0, 12 -3). The tutor does not need to show an interest in students or the group (21 0), nor are students looking for a personal connection with the tutor (4 -4). Students also do not want the tutor to tell them exactly what to do and when to do it (36 -5), nor to function as a classroom manager (32 -1) or to give them compliments (17 -4).

Role of medical school
Medical schools should offer opportunities to prepare for a future career in clinical practice, including communication, collaboration, personal and professional development (54 +4, 50 +3, 34 +2). It is important that the school allows for tailoring to personal interests (49 +3), and provides suitable and difficult challenges (14 -5, 44 +4). This includes accounting for different levels of competencies. Digital learning tools might be suitable for these purposes (30 +1).

DISCUSSION

In this study, we identified four student profiles that describe shared viewpoints on appreciation of small-group active learning. Although the profiles have some degrees of overlap, each profile can be characterized by distinct preferences for students' own role in the learning process, their study groups, their tutors, and how they would like to be supported in their learning by their medical school. These preferences correspond to the students' motives for learning. Students stated in the interviews how their motivation and engagement was (at least partly) dependent on the perceived match between their viewpoint and the learning activities. Comparing the profiles shows why engaging all students in a class can be difficult for teachers: they have conflicting preferences. When a teacher aligns with the preferences of one profile, for example with profile 1 by engaging in an in-depth group discussion not directly related to the course objectives, students in another profile might not see the value of that learning activity (in this case profile 2 would question the value of the discussion for the assessment).

Epistemic beliefs

We found that students in profile 2 have dualistic beliefs ('there are correct and incorrect answers, and teachers should tell me so I can memorize them'). Students in profiles 1, 3, and 4 have multiplistic beliefs ('multiple answers can be correct and discussing those is important for learning'). We did not find students with relativistic or committed beliefs in our sample. This is not surprising as students are expected to evolve more sophisticated beliefs over the course of their medical study (16). We found that students have low motivation and engagement when there is a mismatch between their beliefs and the teacher's expectations or learning activities. When teachers design their classes to include learning activities in which there are no clear-cut right answers (i.e., cater to students with multiplistic beliefs), one can imagine how students with dualistic beliefs would be less motivated to engage. These students would experience the learning activity as an ineffective and inefficient use of their study time.

Studies on epistemic beliefs show that it is effective to explicitly address and reflect on epistemological themes to promote more sophisticated beliefs (16). Related to this study, this means that teachers should acknowledge different epistemic beliefs among their students, and elaborate on the importance of small-group active learning for their development. This will help to align student beliefs and teacher expectations. A recent study by Deslauriers et al. (7) adds to that by recommending that teachers help students to appreciate active learning *early* in the learning process. Teachers could take time to elaborate on the value and requirements of active learning, and introduce formative or summative feedback early in the course to help students see their development. This could help to improve student motivation for active learning.

Approaches to learning

We identified aspects of deep learning (predominantly in profile 1), surface learning (predominantly in profile 2), and vocational learning (predominantly in profile 4). These findings correspond with Mattick and Knight's study on medical students' approaches to learning (36). Mattick and Knight also describe the importance of social factors for learning. In our study, we identified one profile that places social motivation at the very center of their learning (profile 3). In this profile, social motivation was seen as important and was positive (social support and opportunity for making friends). This differs from the findings by Mattick and Knight, who found that social motivation only became important in clinical stages of medical training, and comprised of humiliation-avoidance, showing off to others and feeling negative emotions when not doing what is required.

Mattick and Knight (36), along with other studies into approaches to learning, recommend teachers to stimulate deep learning as it is supposed to be associated with academic achievement (37). However, a recent systematic review of meta-analyses shows deep learning to "have no systematic relation with achievement" (3). On the contrary, it is suggested that teachers help their students to employ a strategic approach to learning; to regulate their learning strategies as required from a task or activity combined with a motivation for achievement (3). Related to the current study, this means that teachers can help their students by relating students' motives and preferences to the course's learning and assessment activities, and elaborate on what is needed for success. Most often, students will probably have to employ a combination of approaches: engaging with peers to construct meaning from a learning activity, or understanding how an exam helps to prepare for future practice. As especially students' perception of assessment requirements affect how students approach learning, we do recommend teachers to design sound (formative and summative) assessment activities (38).

Implications for practice

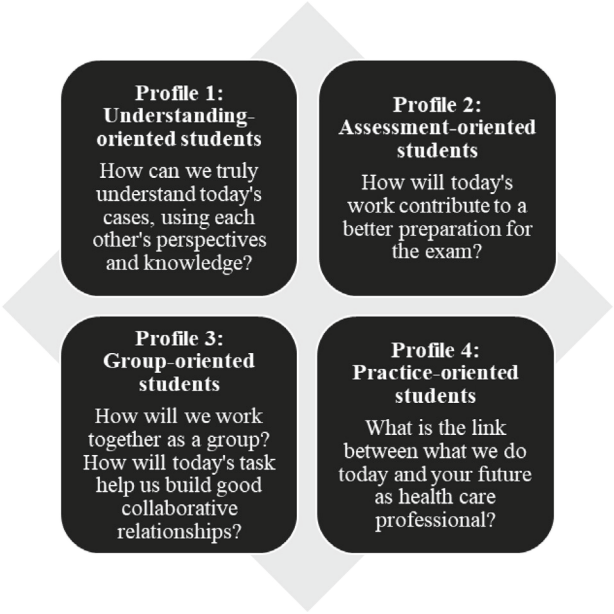
As stated before, student engagement in small-group active learning is the result of many interacting factors, ranging from curriculum design to teacher behaviors to student sociodemographic characteristics. This study gives more insight into the students' perspective: when and why do they appreciate active learning? We identified four profiles to answer that question. Teachers could use knowledge of the profiles to make better decisions when designing and teaching their class.

When designing a class, teachers can reflect on the active learning methods they employ and anticipate which students might engage more easily (and why), and which students might be reluctant to engage (and why). To give some examples: students in profile 1 (understanding-oriented) usually engage easily in in-depth group discussions when it sparks their interest, while students in profile 2 (assessment-oriented) might want to understand the relevance for the assessment first. Students in profile 3 (group-oriented) usually engage easily in collaborative exercises that strengthen their relationships, like escape rooms, while students

in profile 4 (practice-oriented) will be critical about its value for their future profession. Typically, teachers have multiple activities to choose from when designing their classes. By choosing and adapting activities that cater to different profiles, student engagement could be stimulated.

When teaching a class, teachers could start a 'meta-conversation' to aid the learning of students, by acknowledging the different motives and preferences, and elaborating on the value of the learning activity for different students (the Q-set and Q-sorting procedure used in this study could be transformed into a learning activity for this purpose). Often when teachers introduce a learning activity, they do so briefly and get started. Not many teachers talk explicitly about how learning might take place. This leaves students to have to interpret the value of the activity for their learning. We propose that in the introduction of each class, teachers address the concerns and preferences of each profile by answering a few questions (figure 2.3). One important caveat: our proposal assumes sound basic course design principles, like constructive alignment, to be in place.

Figure 2.3. Teachers' aid for starting a 'meta-conversation' about active learning



Strengths and limitations

The use of Q-methodology allowed us to identify authentic viewpoints of medical students regarding small-group active learning. By interviewing first-year students at the start of the academic year, we have gained an in-depth understanding of students who enter medical school. Designing our study using the conceptual frameworks of active learning, epistemic beliefs, and approaches to learning allowed us to better understand the origins of the specific preferences of students and improves the generalizability of our findings. However,

the profiles reflect the preferences of participants in this study. We do not know how biased our sample was and if we have missed existing preferences. We are aware that some students are more inclined to participate in (medical) educational research than others and have tried to counteract this by communicating explicitly our wish to include all sorts of students. We have focused on the relationship between students' appreciation for active learning and engagement. As students indicated in the interviews (and as is known from literature), other factors also affect their engagement.

Future research

A follow-up study with the same participants might show how the students and profiles develop over time, and what the causes of these developments are. For example, research shows that clinical experience influences the epistemic beliefs of medical students (16). It is unclear how perceptions of, and preferences for, active learning changes as more sophisticated epistemic beliefs evolve. This offers potentially valuable information for improving medical education. In addition, as we have given suggestions for teachers to improve motivation and engagement of students for (active) learning, the impact of these suggestions could be investigated. How effective are our suggestions in terms of student and teacher appreciation of active learning? Do they help teachers to motivate and engage students? A third suggestion is to focus on teacher appreciation of active learning. Teachers vary in their appreciation of active learning, depending on their conceptions of teaching and learning (39). Their appreciation might be reflected in their teaching practices, favoring other types of learning. This future study could yield suggestions to improve teacher motivation for active learning, as the current study did for students.

CONCLUSION

It can be difficult for medical teachers to motivate and engage their students in small-group active learning methods. In this study, we have identified four profiles that describe when and how students might be motivated for small-group active learning. We have used the concepts of epistemic beliefs and approaches to learning to explain the diversity in students' appreciation for active learning. Teachers can use the profiles to reflect on the use of active learning in their courses and relate to the different motives and preferences of medical students. This allows teachers to optimize their course design choices regarding active learning, as well as communicating about it with their students, so that all students have higher motivation and engagement.

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CHAPTER 3

Changes in student appreciation of small-group active learning: a follow-up q-methodological study

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ABSTRACT

Background

Differences in students' epistemic beliefs and approaches to learning influence how they appreciate small-group active learning methods. As students develop and advance through their study program, it is likely that their epistemic beliefs and approaches to learning change. However, it is unclear how these changes influence their appreciation of small-group active learning, and what this means for teachers who want to motivate and engage students at various stages of their study program. In a previous paper, we published findings of first-year medical students. In the present study, we followed up on the original students in their fourth year.

Methods

We repeated the Q-methodological study procedure from the previous study to explore change in appreciation of small-group active learning. Participants rank-ordered 54 statements, answered open-ended questions about their rank-ordering, and completed a demographic questionnaire. We also invited participants to take part in a subsequent interview to reflect on changes in their beliefs about small-group active learning since their start of medical training.

Results

Twenty students participated (38.5% of the original sample). We decided on a 2-profile solution. Profile 1 students were 'success-oriented', while profile 2 students were 'development-oriented'. Students' appreciation of small-group active learning remained fairly stable over time, although key aspects related to students' epistemic beliefs and approaches to learning developed. Seven students took part in the subsequent interview and reported personal, group, tutor, and medical program reasons for changes in their appreciation of small-group active learning.

Discussion

This study showed how and why medical students' appreciation of small-group active learning changed over time along with development of their epistemic beliefs and approaches to learning. These findings contribute to the study of active learning in (medical) education because they highlight the development of students as they advance through their studies. What motivates and engages first-year students is not necessarily motivating and engaging for students in later stages. Our findings support the development of interventions that can help teachers to teach in active learning settings.

INTRODUCTION

Active learning is a common and generally effective way to develop students' knowledge, skills, and attitudes (1–4). However, its effectiveness depends on a complex interplay of student-, teacher-, and contextual factors (5–8). An additional complicating factor is the development of students when they gain knowledge, skills, and attitudes during their studies, as this causes a change in those factors (9–11). This means that student factors can be dynamic in nature and change over time.

In a previous study, we identified how first-year medical students appreciated active learning differently, depending on their study motives and preferences for learning (12). Students in that study reported how they were more motivated for active learning methods when these matched with their motives and preferences. However, recent publications in medical education emphasize the importance of active learning for later stages of medical training as students become interns and then physicians who should be capable of both independent and collaborative functioning (13–16). Therefore, in the present study, we aimed to explore changes in student appreciation for active learning over time, and evaluate the meaning of these changes for teachers who design and teach small-group active learning classrooms in various stages of a study program.

Conceptual framework

Two student factors that have been shown to influence students' motives and preferences for learning are epistemic beliefs and approaches to learning. Both have been shown to change over time (17,18).

Epistemic beliefs are defined as the personal convictions about the nature and process of knowledge, knowing, learning, and intelligence, although the concept varies across scientific fields and authors (19,20). Perry (21) describes that students develop through four different stages and that at each stage, students' attitudes toward knowledge change. In the first stage, 'dualism', students perceive all knowledge to be either right or wrong, and that it is their task to learn the right knowledge from experts who have that information. In the second stage, 'multiplicity', students realize that not all knowledge is right or wrong and that there can be different answers depending on the perspective one takes. In the third stage, 'relativism', students weigh different answers and make choices dependent on contextual information. In the fourth stage, 'commitment', students reflect on their values, commit to taking action based on those values, and take responsibility for any outcomes (18,20–22). Research shows that students' epistemic beliefs progress as students advance through their study program (18). Research also shows that differences in epistemic beliefs are related to differences in students' preferences for teaching and learning methods (12,23,24). Dualist thinkers prefer experts who tell them what to know, whereas students in later stages prefer multiple sources of information and the opportunity to shape their own perspectives.

Approaches to learning describe students' general intentions and strategies for approaching their studies (25–27). Originally, a surface and deep learning approach were identified. Students with a surface learning approach have the intention to pass a task or exam with a strategy relying on memorization, while students with a deep learning approach have the intention to understand with a strategy focusing on relating information. Later, a strategic approach was added in which students have an intention of high achievement and a strategy combining deep and surface elements (26). Research shows that students tend to change their approaches to learning over the course of their studies, becoming more strategic and deep learners (28,29), although not all studies find this same development (17). Research shows that approaches to learning are related to differences in students' preferences for teaching and learning methods (12,30). Surface learners prefer to memorize clear-cut knowledge from lists and books, whereas deep learners prefer to engage with the content in challenging assignments. Strategic learners' preferences depend on their perception of the effectiveness of certain methods for achieving a high grade.

Research aim

In a previous paper, we reported on first-year medical students' appreciation of small-group active learning (12). We identified four profiles of students in that study: understanding-oriented, assessment-oriented, group-oriented, and practice-oriented. These profiles described when and why students appreciated small-group active learning and were influenced by students' epistemic beliefs and approaches to learning. The present study aims to investigate how and why students change during the Bachelor program by collecting data three years after the original study. With this knowledge, we could gain a better understanding of student development during their studies, and teachers could be better equipped to design and teach active learning classes at various stages of a study program.

METHODS

Setting and participants

For this study, we invited medical students from a university in the Netherlands to participate. Medical education in the Netherlands consists of a three-year Bachelor program, followed by a three-year Master program (31). A national framework describes the required minimal end qualifications of medical training (32). The end qualifications integrate knowledge, skills, and attitudes, and are based on the CanMEDS framework (33).

The students participating in this study were fourth-year students who just started their Master's or were finishing their Bachelor's. As such, they have had three years of a tutoring course. They started in September 2018 with this tutoring course in a face-to-face format. From March 2020, they made the switch to an online or mixed format due to the COVID-19 pandemic. This course was designed as a small-group (max 12 students) active learning setting (34), in which students meet twice per week to discuss patient cases and complete associated assignments. The small-group meetings were linked to lectures, labs, and other

meetings, and aimed to integrate and apply knowledge, skills, and attitudes gained at those meetings. In the first two years, students chair the meetings, meaning they take turns leading the meetings, brainstorm for the cases and assignments, and complete these cases and assignments in subgroups to present to each other. Teachers in the tutoring course are called tutors. Tutors work for the medical school and usually have a medical or research background. Tutors guide the process, give feedback on professional behavior and personal competencies, and support professional development. In the third year, students meet once per week and tutors are in charge of the meeting. The third year has a focus on clinical reasoning skills because students can enter medical practice as interns in the following year. Tutors are therefore also actively involved in discussing the content in year three.

Study design

We conducted a Q-methodology study (35–38). "Q-methodology is a research technique, and associated set of theoretical and methodological concepts, originated and developed by William Stephenson, which focuses on the subjective or first-person viewpoints of its participants" (38). This method is used to create clusters of people with similar viewpoints (i.e., factors or profiles), which can be compared and contrasted with each other. As such, it is a way to do person-centered analysis, instead of variable-centered analysis (39). Q-methodology has been used in education to investigate the viewpoints of students, teachers, and other educational professionals (40).

The Q-set (set of statements for participants to rank-order according to agreement) and distribution grid (prearranged frequency distribution for placing the statements) used in the present study were developed, used, and published in a previous paper (12). A summary of the Q-set development has been included in the legend of Table 3.1. We refer the reader to Grijpma et al., 2021 (12) for further information. The Q-set consisted of 54 statements regarding various aspects of active learning, epistemic beliefs, and approaches to learning (Table 3.1).

Table 3.1. Q-set statements. Reproduced with permission from Grijpma et al., 2021 (12)

		Factor array[2]	
No.	**Statement[1]**	**1**	**2**
1	I wish for a tutor who is an inspiring example (role model)	-4	-1
2	The tutor should bring in and discuss their own experiences	-1	+2
3	If a topic is interesting, I do not mind when study group meetings run late	-2	+1
4	I would like to get to know the tutor personally	-1	-2
5	Study groups should contribute to the development of friendships	0	0
6	The tutor should respond quickly to students' emails	+1	0
7	The tutor should ensure that we understand the clinical aspects of study assignments in particular	+2	-2
8	The tutor should assess the quality of my assignments	-2	-4
9	I find it frustrating having to collaborate with other students	-5	-4
10	I prefer collaborating with students whose viewpoints differ from mine	-2	0
11	The tutor should be available for students' study-related problems	+2	0
12	The tutor should be available for students' personal problems	+3	-1
13	If there are problems in my study group, we should solve them on our own	0	+2
14	I prefer to not have any difficult study assignments	-5	-5
15	I prefer collaborating with as many different students as possible	-1	0
16	The tutor should give me useful feedback	+4	+5
17	The tutor should give me compliments regularly	-2	-4
18	I like to receive a lot of feedback from the students in my study group	0	+1
19	Feeling heard during study group meetings is important to me	+4	+3
20	Study group meetings should be well-structured	+1	0
21	The tutor should show an interest in how I am doing and how the study group is doing	+3	0
22	The tutor should be able to explain clearly	+3	+2
23	All students should be well-prepared for the study group meetings	-2	-1
24	I think it is important to evaluate our group process	-1	+1
25	Study group meetings should prepare us for the exams	+4	+1
26	I prefer that the tutor motivates me to find answers to questions, rather than giving me the answer	0	+2

Table 3.1. Q-set statements. Reproduced with permission from Grijpma et al., 2021 (12) (continued)

		Factor array[2]	
No.	**Statement[1]**	**1**	**2**
27	The tutor should motivate my study group to start working on assignments and to stay focused	0	-2
28	I think it is important that all students in my study group feel free to express their thoughts	+5	+4
29	I dislike it when questions get discussed superficially	-1	0
30	IT (digital/online possibilities) is an essential aspect of the learning process for me	-1	-1
31	The tutor should have a sense of humor	-3	0
32	The tutor should manage the group during study group meetings	0	-1
33	I think it is important that all students actively contribute to study group meetings	+3	+4
34	The study assignments should have a clear link with clinical practice	+2	-1
35	Study assignments should have a clear right or wrong answer	0	-3
36	The tutor should tell me exactly what to do and when to do it	-3	-5
37	The tutor needs to have studied medicine	0	-3
38	It is important to me that all students perform their tasks well	+1	+2
39	I prefer lectures over study group meetings	-2	-2
40	I wish to have the same tutor for as long as possible	-4	-3
41	The tutor should take students' individual needs into account	0	-1
42	The tutor should have an understanding for the life of students besides their studies	+2	0
43	As a study group, we should be able to decide how we want to collaborate	+1	+1
44	I think it is important to be challenged to learn	+1	+3
45	I think it is important that there is variation in study group meetings	+1	+2
46	The tutor should have high expectations of me	-4	-2
47	The tutor should coach study groups with passion	+1	+1
48	It is important to me that my study group has a good atmosphere	+5	+5
49	I want to be able to deepen my knowledge on topics that I find interesting	0	+3
50	Study assignments and study group meetings should prepare me for more than only treating patients	+2	+3

Table 3.1. Q-set statements. Reproduced with permission from Grijpma et al., 2021 (12) (continued)

		Factor array[2]	
No.	**Statement[1]**	**1**	**2**
51	The tutor should focus mainly on the process of learning, and should not interfere with the content	-3	-2
52	I think it is important to learn how to analyze and solve problems	+2	+4
53	The tutor should be able to answer questions about the entire medical program	-3	-3
54	Study assignments and study group meetings should contribute to my development as a person	-1	+1

[1] *Statements were created from relevant scientific literature, medical school educational policy documents, student evaluation forms, observations of study group meetings, and stakeholder interviews. Through iterative discussions with research team, statements were classified into four categories: preferred roles and responsibilities of 1) students; 2) study groups; 3) tutors; 4) medical training. The final Q-set included items representing all categories.*

[2] *Factor arrays are the weighted averages of participants in a factor (i.e., how a prototypical student in a factor would rank-order the statements). This study resulted in two factors. Factor 1 was the Success-oriented student profile, Factor 2 was the Development-oriented student profile, both described below.*

Procedure

We invited the original participants to take part again (12). In the original study, we collected data through face-to-face interviews. For this follow-up study, due to the COVID-19 pandemic and associated measures, we used an online tool to collect data. We sent an email offering information about the study and a link to the Easy-HtmlQ website used for data collection (41). The website contained step-by-step instructions on how to conduct the rank ordering (i.e., Q-sorting procedure), starting with giving their informed consent. After that, the participants sorted all statements into three digital piles (disagree, neutral, agree). Then they saw the distribution grid and rank ordered statements from the three piles onto the grid by clicking and dragging each statement. They were asked to reflect on the final position of statements (the Q-sort) and make adjustments if desired. Afterwards, the participants answered open-ended questions about their reasons for placing statements at the ends of the distribution grid, and if they believe they changed in opinion about those statements over the years. We reminded participants about maintaining the privacy of their data and our motivation to understand (not judge) students and their preferences, so the participants were reassured and stimulated to be open and reflective in their answers. In the last step, participants completed a demographic questionnaire and were asked whether they wanted to take part in a follow-up interview.

Students who were willing to take part in the (optional) interview, were scheduled for a meeting via Zoom. JWG conducted the interviews. During the interview, participants were shown their Q-sort and answered questions regarding the Q-sorting process, thoughts or feelings about specific statements, and the choices they made. These interviews were used to gain a deeper insight into their perspectives. Participants were then asked to reflect on their perceived change in the last three years. For this, we used a visual aid: a list of statements on which they differed most in the two measurements (e.g., a statement which they placed at +5 in 2018, and -3 in 2021).

Analyses

We split the analyses into two parts. The first part was concerned with identifying factors in the new data. The second part was concerned with change: identifying how and why factors changed between 2018 and 2021.

Part 1: Identifying factors

We used Ken-Q Analysis Desktop Edition to analyze the quantitative data from the Q-sorting procedure (42). We followed procedures outlined by Watts and Stenner (38). We extracted factors using the Centroid Method with Varimax rotation. JWG, AC, and RAK evaluated the outcomes of the analysis in three steps. In the first step, we evaluated eigenvalues (>1.00), if factors had at least two significant loading Q-sorts, and aimed to achieve at least 40% explained variance. In the second step, we evaluated if the qualitative interview data supported the factors. In the third step, we evaluated if the factors made sense to us (coherent, differentiated, recognizable) and if they fit the two conceptual frameworks.

Factor interpretation was done using an expanded version of the crib sheet suggested by Watts and Stenner (38). Factor arrays were the basis for factor interpretation. These are the weighted averages of Q-sorts in a factor, and thus how a prototypical student in a factor would sort the statements (Table 3.1). We first looked at a factor's highest and lowest scoring items, added statistical and demographical information, and built an initial story. We then looked at items ranked higher or lower than other factors, items in the middle, distinguishing statements, and consensus statements to expand the story. Then, we added the qualitative data from the interviews and our notes to connect the different parts of the story. Finally, we checked the accuracy and clarity of factor descriptions by reviewing the factor descriptions holistically and ensuring they reflected our understanding of the factors.

Part 2: Identifying how and why factors changed

There are few published Q-methodological studies investigating change in subjectivity, and different authors have chosen different methods for analyzing change (43). There are no clear or accepted guidelines to follow for these types of studies. Therefore, before we started analyzing our data, we set out to formulate guidelines for the analysis. We consulted published Q-studies with comparative designs, attended the 2020 ISSS virtual Q conference

session on longitudinal Q-studies, and sought counsel from the Q-methodology Listserv. We also had a meeting with experienced Q-researcher Job van Exel, who has published Q-studies with a longitudinal design. Based on the information we gathered, we created a guideline for analyzing change using mixed (quantitative and qualitative) methods.

1. We correlated participants at Time 1 (T1, data collected in 2018, when the students had just started medical training, published in Grijpma et al., 2021 (12)) and Time 2 (T2, data collected for this follow-up study in 2021, three years after T1) to explore the degree to which participants' appreciation for small-group active learning changed, by looking at the mean and range of the correlations. This would give us a first insight if a change had indeed occurred;
2. We explored the extent to which participants changed in their association with the original factors by correlating the two Q-sorts of participants with the original factors. This would give us insight if participants moved away from the original factors;
3. We explored the transition that participants made from T1 to T2, by drawing lines from the T1 factors to the T2 factors. This would give us insight into the change that students go through;
4. We correlated the factor arrays of T1 and T2 (a second-order factor analysis) for a quantitative comparison of all factors (38). This would give us further insight into the differences between the T1 and T2 factors;
5. We summarized the two T2 factors, and compared those to the summarized four T1 factors, for a side-by-side comparison;
6. We asked students in the (optional) interview after the T2 measure to reflect on the changes they have gone through in the past three years. We asked two main questions: 1) if you reflect on the past three years, how do you think your appreciation of small-group learning has developed, and what do you think are the reasons behind these changes? 2) After being shown the statements on which a participant most changed in the two Q-sorts: what has changed for you? Answers were written down by the interviewer and used to understand and describe the key drivers that students reported causing a change in their appreciation for small-group active learning methods. Our approach mimics that of conventional content analysis used in qualitative research (44). We first reviewed our notes, highlighting parts of the text related to change and creating an initial list of key drivers. We then compared answers from participants, and clustered similar information together. Then, from the clustered information, we created a description of the driver. Lastly, we evaluated if the key drivers would fit in the same four categories as the factor descriptions. All but the 'group' category fit, which we deemed too narrow. A category called 'social' better fit the answers from the participants.

Ethics

We obtained ethical approval from the Ethical Review Board of the Netherlands Association for Medical Education (dossier number 1062).

RESULTS

Participant characteristics

In 2018 (12), fifty-two students participated and we identified four factors (understanding-oriented students, assessment-oriented students, group-oriented students, and practice-oriented students). In this 2021 follow-up study, 20 students of that original sample participated (38.5%). Compared to the original study, this follow-up study included participants from all four original factors, including one participant who did not fit in one of those factors and one participant who loaded significantly on multiple factors. The mean age of the twenty students was 21.8 years old (range 20-26). Seventy percent were female (78.8% in the original sample), which is representative of the student population at our medical school. Two students were finishing their Bachelor's, one took a gap year before starting their Master's, while the other participants had just started their Master's. Seven students agreed to the optional interview.

Factor analysis and profile description

A two-factor solution best fitted our criteria for evaluating factor solutions. As each factor represents a group of students with similar viewpoints, instead of a group of items, we will use the word 'profile' instead of factor from this point onwards. The profile descriptions below are the result of the factor interpretation process described in *Part 1: identifying factors* and thus an integration of quantitative and qualitative data. Between brackets are the number of a statement and their position on the distribution grid. For example, 25 +4, means statement 25 (see Table 3.1) was placed on position +4 of the distribution grid.

Profile 1: Success-oriented

Role of students

Students in this profile focus on study success. They want to do well on their exams (25 +4) and in their upcoming internships (34 +2). As exams in year 3 test clinical reasoning skills, and their internships require them to demonstrate this skill, understanding and practicing the reasoning process behind (clinical) questions is important to these students. They understand that the specific outcomes or answers to questions are less important. When these students cannot see the link between learning activities and exams or internships, they disengage from learning.

Role of study group

Students in this profile value active (33 +4) and collaborative (9 -5) learning. They feel that engaging with each other is a good way to learn the clinical reasoning and interpersonal skills necessary for medical careers. For optimal learning in a group setting, they feel it is important to have a safe learning environment (19 +4), with a good group atmosphere (48 +5), in which every student feels free to share their thoughts (28 +5). Although students in this profile are open to hearing different viewpoints, they dislike it when their group

consists of people with opposite interests and opinions (10 -3). They feel this can cause frustration between group members, which can lower the effectiveness of the learning process by negatively influencing the group atmosphere.

Role of tutor

Students in this profile feel that tutors are important for their study success. First, tutors should help them understand the content of learning (7 +2; 51 -3). For this, they do not think tutors require a medical background (37 0) or be a role model (1 -4). They do require their tutors to have adequate knowledge to stimulate their thinking, to be able to answer questions, and explain clearly when they do not understand (22 +3). Second, tutors should monitor how their students are doing (21 +3). Students appreciate it when tutors notice and provide help with personal or study-related problems (11 +2; 12 +3). Last, tutors should not have very high expectations or demands from their students (46 -4). Tutors should understand that students have obligations besides their studies (42 +2) and not let meetings run late (3 -2).

Role of medical program

Students in this profile feel that their medical program should ensure that the study group meetings and assignments adequately prepare them for the exams (25 +4). This is a major motivation for their engagement during the meetings and completing the assignments. A second motivation is the upcoming internships after this year (34 +2). Students appreciate when the meetings and assignments help them prepare for their role as interns in a department. Because of these two motivations, students like to engage in assignments that challenge them and help them do well (14 -5).

Profile 2: Development-oriented

Role of students

Students in this profile focus on their personal and professional development. They want to learn how to analyze and solve problems (52 +4) and gain a substantiated perspective of the medical profession and its demands (50 +3). Challenging assignments motivate them as these help them to gain a deep and meaningful understanding of a subject (44 +3). Their motivation increases even more when they get a chance to learn about themselves, explore topics they find interesting (49 +3), and feel they are responsible for their learning (8 -4). Without challenge (14 -5) or autonomy (36 -5), these students quickly disengage from learning.

Role of study group

Students in this profile value active (33 +4) and collaborative (9 -4) learning, as they feel it is a fun way of learning. They enjoy study groups the most when all students participate (33 +4), say what they think without fear of judgment from peers or tutors (28 +4), and when there is a good atmosphere (48 +5). They feel that study groups should be able to manage

themselves. This means that study groups should regulate their behavior and attention to time management (3 +1), solve problems that might arise in a study group (13 +2), and regularly evaluate their functioning (24 +1).

Role of tutor

Students in this profile appreciate tutors who give responsibility for learning to the group and act as an observer and as a source of non-clinical information. As an observer, tutors should give feedback that stimulates their development as doctors and human beings (16 +5). Feedback allows them to draft personal learning objectives and to critically reflect on their performance. To create a sense of urgency and relevance for working on these personal learning objectives, tutors should share personal experiences and anecdotes (2 +2). Because these students focus on development, they appreciate comments on how to do better more than compliments (17 -4). As a source of non-clinical information, tutors should have diverse backgrounds. Examples given were research, psychology, philosophy, and management (37 -3). Their vision and experiences help to develop the broad understanding of healthcare students in this profile are looking for (7 -2). Students in this profile also place more importance on the tutor's ability to guide the learning process, rather than instructing them about the content (51 -2). Students have developed their own way of studying the content, and tutors should allow that (36 -5; 8 -4).

Role of medical training

Students in this profile want to be challenged (14 -5). When study content and assignments develop new insights, students are more motivated and engage with each other meaningfully to achieve understanding. Study group meetings do not always have to prepare students for the exam (25 +1) or their upcoming internships (34 -1). Students in this profile appreciate learning about diverse healthcare-related subjects, and their perspectives on (clinical) problems. They realize that ambiguity and uncertainty are part and parcel of (clinical) practice and that context and personal expertise or vision decide what makes a solution better or worse (35 -3). That is why these students feel medical training should aim to develop the person behind the doctor, and not only their ability to diagnose patients (50 +3; 54 +1).

Changes in learning preferences

Here, we report the findings according to the guidelines we created and described in *Part 2: identifying how and why factors changed*.

1. The mean correlation between participants' Q-sorts at Timepoint 1 (T1, original study, data from 2018, when participants started the first year of medical training) and Timepoint 2 (T2, this follow-up study, three years later) was 0.54, with a range of 0.22-0.70. The moderately high and positive correlations indicate that, for most participants, their appreciation for small-group active learning remained fairly stable over three years.

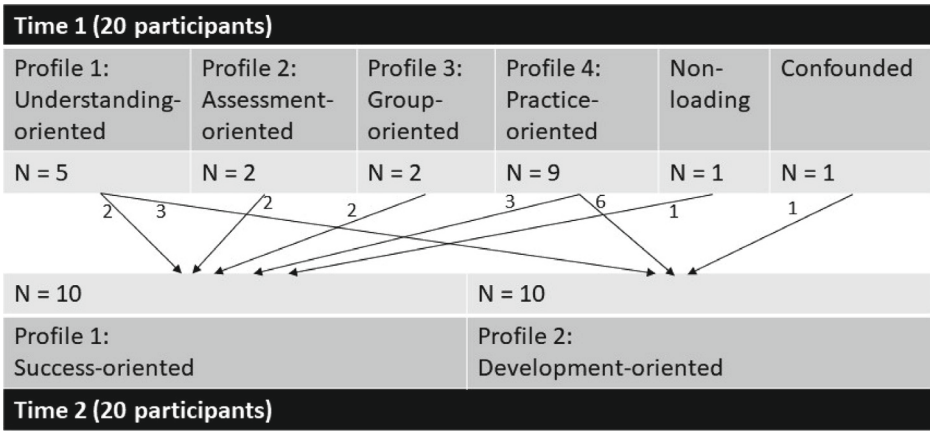
2. The stability of students' appreciation for small-group active learning was further shown when we explored if students changed in correlation with their original profile. Table 3.2 shows the 18 participants at T2, who originally loaded significantly with one profile (two students did not load on a factor at T1). The mean correlation difference was -0.13, with a range of -0.36-0.07. The (very) weak negative correlation difference shows that most participants have changed little.

Table 3.2. Correlation differences between T1 and T2

	Correlation at T1 (2018)	**Correlation at T2 (2021)**	**Correlation difference**
Profile 1: Understanding-oriented			
Participant 1	0.66	0.65	-0.01
Participant 2	0.62	0.56	-0.06
Participant 3	0.82	0.54	-0.28
Participant 4	0.79	0.71	-0.08
Participant 5	0.82	0.64	-0.18
Profile 2: Assessment-oriented			
Participant 6	0.67	0.62	-0.05
Participant 7	0.56	0.46	-0.10
Profile 3: Group-oriented			
Participant 8	0.73	0.67	-0.06
Participant 9	0.75	0.70	-0.05
Profile 4: Practice-oriented			
Participant 10	0.67	0.44	-0.23
Participant 11	0.78	0.68	-0.10
Participant 12	0.73	0.37	-0.36
Participant 13	0.65	0.55	-0.10
Participant 14	0.75	0.64	-0.11
Participant 15	0.54	0.35	-0.19
Participant 16	0.82	0.61	-0.21
Participant 17	0.65	0.72	0.07
Participant 18	0.77	0.48	-0.29

3. Figure 3.1 shows the transitions of participants from T1 to T2. It shows how, for example, two participants from T1 Profile 1 (understanding-oriented) transition to T2 Profile 1 (success-oriented) and three participants to T2 Profile 2 (development-oriented). The non-loading participant is the participant who did not load significantly on one profile at T1, and the confounded participant is the participant who loaded significantly on multiple profiles at T1.

Figure 3.1. Transitions of participants from T1 to T2



4. The second-order analysis of the factor arrays from T1 and T2 shows that the profiles from T1 and T2 overall have high correlations (Table 3.3). T1 profile 2 (assessment-oriented students) has the lowest correlations with the other factors, indicating this profile is most different from the other profiles. Interestingly, the two participants who were part of T1 profile 2 transitioned to T2 profile 1, yet this profile does not have those same low correlations, indicating the profiles became more alike.

Table 3.3. Second-order analysis of factor arrays from T1 and T2

	T1 Profile 1	**T1 Profile 2**	**T1 Profile 3**	**T1 Profile 4**	**T2 Profile 1**	**T2 Profile 2**
T1 Profile 1	100					
T1 Profile 2	45	100				
T1 Profile 3	71	48	100			
T1 Profile 4	78	47	76	100		
T2 Profile 1	71	70	80	70	100	
T2 Profile 2	85	35	77	83	70	100

Table 3.4. Summary of the four profiles. Reproduced and adapted with permission from Grijpma et al., 2021 (12)

	Time 1 (2018)				Time 2 (2021)	
	Profile 1 Understanding-oriented	**Profile 2** Assessment-oriented	**Profile 3** Group-oriented	**Profile 4** Practice-oriented	**Profile 1** Success-oriented	**Profile 2** Development-oriented
Role of students	Develop a deep understanding of all aspects of medicine	Learn what has to be learned for the assessments	Contribute to good atmosphere in study group, and engage with peers on content	Prepare for future career in clinical practice	Do well on exams and in internships	Develop personal and clinically relevant knowledge, skills, and attitudes
Role of study group	Opportunity to learn from other students' perspectives	Ask questions and improve understanding of the content	Social network (friends), and social support system	Learn collaboration skills needed as a doctor	Learn clinical reasoning and interpersonal skills	Self-regulate their functioning
Role of tutor	Motivate students to engage with study material and challenge them to find their own answers	Explain the content as a subject matter expert, and be available in case of study delays	Observe group process, and give feedback on longterm development of students	Start group process, then make themselves obsolete	Stimulate understanding and monitor well-being	Provide feedback on personal development and stimulate perspective-taking
Role of medical school	Offer stimulating cases to challenge students	Match study assignments with the assessments	Provide trust and autonomy to study groups	Offer tailored practice opportunities	Offer opportunities to practice clinical reasoning skills	Develop the person behind the doctor and gain a broad understanding of the medical field

5. We added the summary of the two T2 profiles, to the summary of the four T1 profiles, for a side-by-side comparison (Table 3.4).
6. The key drivers for change, as reported by students, were:

Personal

Students reflected on their personal growth and how it led to changes in their motivation for small-group learning. Over the course of their Bachelor's, they became more aware of what they found important in their lives, studies, and (future) work. They also mentioned being more assertive, confident, bold, autonomous, and trusting in their knowledge and skills. The more the small-group learning design matched their developing personal goals and competencies, the more they felt motivated. Students who continuously felt this match reported sustained motivation.

In terms of their cognitive development, students mentioned realizing that not everything has or needs a single right answer. They learned that some situations potentially have multiple answers, and becoming a good doctor requires learning to weigh options and dealing with accompanying feelings of uncertainty. In reaction to this realization, students reduced their focus on learning facts and figures and increased their focus on learning to think, reason, and apply knowledge.

Social

Students reflected on the value of collaboration and relationships. In groups with a good atmosphere they paid more attention, contributed more, and learned more. Some said that they received their best grades while in groups with a good atmosphere, and their worst grades while in groups with a bad atmosphere. They also mentioned how friends and networks helped them in their training and in finding jobs and internships.

Because of these experiences, students appreciated small-group learning more. They engaged more with their peers and tutors, felt they got better at it, and proactively sought opportunities to collaborate. In terms of social development, students reported changing from a focus on individual learning to collaborative learning and feeling responsible for the success of small-group learning.

Tutor

Students reflected on the role of the tutor in small-group learning. Their opinion of tutors changed over time because of experiences with different tutors. Although students differed in the balance between the two, all students felt tutors should be able to guide the learning process and answer questions about the content. This changed from year one, where some students had felt tutors only needed to do one of the two. As students advanced through medical training and internships came closer, students valued tutors' anecdotes more because they deemed these as trustworthy experiences that would help them become good interns.

Medical program
Students reflected on their learning experiences in the past three years and how those experiences influenced their learning preferences. Most importantly, students mentioned how the shift to online learning in response to the COVID-19 pandemic had made them realize how important face-to-face meetings were. Online meetings felt impersonal, passive, and non-committal to them. Face-to-face small-group learning, in hindsight, formed a cornerstone of their studies. The regular meetings provided structure and a place to interact with peers. They could discuss personal or study-related issues and have fun. It allowed students to feel part of a group. The shift to online education made this, to a large degree, disappear.

A second educational influence of change in learning preferences was the sense of urgency caused by upcoming internships and the start of their career thereafter. They described how in the first year passing exams had been important, but now they prioritized preparing for the future. This made them appreciate opportunities to practice and learn things needed as an intern – practical knowledge and skills, but also more personal characteristics like being a good intern, and dealing with uncertainty.

A third influence was the design of small-group learning. Students reported that personalized feedback (as opposed to general or generic feedback given to a group) became increasingly important to develop themselves as they advanced through medical training and gained a better understanding of their qualities and areas for improvement. They also mentioned how they could increasingly teach themselves, as they acquired the basic knowledge needed to solve more advanced questions. They also reported learning more from peers in the third year, as students have acquired different knowledge, interests, and perspectives, which made discussions richer. This finding integrated well with students' personal growth and appreciation of multiple perspectives as they experienced that often there is not a single answer to a question.

Finally, assessment remained important over the three years. However, as the goals of small-group learning changed, so did the assessment, and therefore also what students found important in the design of small-group learning activities and meetings. In year one, more factual knowledge was assessed, while in year three it was more about practical and clinical reasoning skills.

DISCUSSION

In this study, we explored fourth-year medical students' appreciation of small-group active learning, and how and why their appreciation changed since their first year. Our first main finding is the 'success-oriented' and 'development-oriented' profiles that describe how students in their fourth year appreciate small-group active learning. The second main

finding is that student appreciation remained fairly stable over time, although key aspects related to students' epistemic beliefs and approaches to learning did develop.

Concerning students' epistemic beliefs, we identified students in the multiplicity stage (profile 1: success-oriented) and the relativism stage (profile 2: development-oriented). The success-oriented students appreciated how questions can have multiple answers, depending on the clinical reasoning process. The development-oriented students went further by stating how context, personal expertise, and vision contributed to evaluating answers and deciding which answers are better or worse. Being able to weigh answers and make context-dependent choices is what distinguishes the multiplicity from the relativism stage (18,20,21). We found no evidence of students in the dualism stage in this follow-up study, whereas we did find that in the original study (assessment-oriented profile) (12). In the original study, we also did not find evidence of students in the relativism stage. Therefore, in line with our expectations, we conclude that students indeed develop their epistemic beliefs through medical training (18). What this study adds to the literature is how students with different epistemic beliefs appreciate small-group active learning differently. Students in the multiplicity stage appreciate the opportunity to practice skills and gain knowledge collaboratively, whereas students in the relativism stage appreciate the opportunity to develop their own contextualized perspective on complex topics collaboratively.

Concerning students' approaches to learning, students become more strategic (profile 1: success-oriented) and deep (profile 2: development-oriented) learners. Success-oriented students indicated how their experience with small-group active learning settings and the way they were assessed made them more aware of how to study for success. The combination of achievement motivation with deep and surface learning strategies is what defines strategic learning approaches (26). Development-oriented students indicated how they wanted to develop a deep and meaningful understanding of the medical field and used their study groups to compare and contrast information from different sources to create their own perspectives. This motivation for a deep understanding with higher-cognitive strategies is what defines a deep learning approach (26). We did not see evidence for a surface learning approach in our sample. The development of students to become more deep and strategic learners has been found in other studies, and was thus confirmed in this study (17,28,29). What this study adds to the literature is how approaches to learning influence students' appreciation of small-group active learning. Students with a strategic learning approach value the interactive and collaborative nature of small-group active learning when they feel it contributes to their study success. Students with a deep learning approach value small-group active learning as a way to develop themselves personally and professionally.

Implications for practice

This study supports the development of interventions to stimulate student motivation for active learning and their engagement in small-group learning activities. We will first

elaborate on the significance of the two profiles we identified in this study, then on the changes in appreciation of small-group active learning over time.

Tailoring education to success-oriented and development-oriented students
The profiles we identified in this study indicate that fourth-year medical students vary in their appreciation of active learning. Whereas the success-oriented students value active learning for helping them to 'do well' on their exams and internships, the development-oriented students value it for contributing to their personal and professional development. Just like in our original paper (12), we suggest teachers and course developers take these motives and associated preferences for learning into account when teaching and designing small-group active learning. Tailoring education to students can contribute in stimulating their motivation and engagement. To clarify, this does not necessarily mean teaching according to the profiles but using knowledge of the profiles to enhance learning. During meetings, teachers can, for example, initiate meta-learning discussions (12,23,45). They can discuss and reflect with students on how the small-group learning design and the way it is taught are aligned with students' motives and how it will help them to achieve course objectives.

Program level interventions to stimulate student appreciation of active learning
The change in appreciation of active learning over the course of three years described in this paper has implications for designing courses and teaching at various stages of a study program.

The first implication is that monitoring of student development over time is advised. By regularly checking with students what motivates and engages them in small-group active learning settings, it becomes possible to adapt education to their needs or have informed discussions about their learning. Active learning effectiveness has been shown to be a complex puzzle with interacting student-, teacher-, and contextual factors (5–8). This study shows how student factors can be dynamic in nature and change over time. By monitoring student development, we gain understanding of one piece of the complex puzzle.

The second implication is that faculty needs to discuss the development of students. Is it necessary for students to reach Perry's relativism or even the committed stage? Are certain approaches to learning more or less desirable? What is the responsibility of teachers and what is the responsibility of students with regards to student development? Depending on the answers, student development might become a more urgent topic for teachers. If this is the case, then targeted interventions can be designed to support the development of students. The interview data of this study indicate which educational experiences and pedagogical approaches contributed to participants' development. Additionally, previous research has identified strategies to develop students' epistemic beliefs (18,20–22) and influence their approaches to learning (25–27). As demonstrated in this study, student appreciation of small-group active learning changed little and as a consequence of many experiences

over the course of three years. Strategies aimed to supporting student development would therefore benefit from a program level approach in which faculty collaboratively designs and implements interventions.

Strengths and limitations

The main strength of our study lies in its design. By inviting students to repeat the study procedure three years after their original contribution, we could examine in-depth how and why student appreciation for small-group active learning changed over time. Although repeated Q-studies have been published, by far most are cross-sectional in design (40,43). The absence of a protocol or accepted guidelines to follow was a challenge, but it offered us the chance to develop an analytical approach. Moreover, as Q-methodology is a way to do person-centered analysis (instead of variable-centered), being able to study students over time, allows for the design of tailor-made educational interventions for students at different stages of their study program (39). Q-methodology can also help decrease the research-practice gap in education by making research findings more recognizable and actionable (39,46,47). The current manuscript, along with the previously published paper with first-year students, provides an example of how research findings can be described in a recognizable way and used to improve educational practice.

There are limitations to the study. First, twenty of the original 52 students (38.5%) participated in this follow-up study. Although Q-studies have been published with fewer participants, this number is rather low. Q-methodology does not rely on large numbers, but enough participants need to be recruited to establish the existence of viewpoints (38). Therefore, strategic approaches to recruitment are advocated in order to ensure a heterogeneous sample with diverse viewpoints. In this study, the twenty participants represented all four original factors and were varied in demographic characteristics (like age and gender), demonstrating its heterogeneity. However, it remains uncertain if additional participants would have influenced the findings.

Second, related to the number of participants, all Q-methodological studies are limited in their generalizability (38). This is also true for this follow-up study. Although our attrition rate (61%) is not higher than in other studies with a longitudinal design (48), we are cautious in drawing generalized conclusions, or writing implications for all medical or higher education studies. However, because of our extensive description of the local context and the grounding of our study in the educational concepts of active learning, approaches to learning, and epistemic beliefs, we believe our findings transfer to other (comparable) contexts (49).

Third, we chose an online approach in this follow-up study because of the COVID-19 pandemic, compared to a face-to-face approach in the original study. Online Q-studies have been performed pre-COVID-19 and are described as cost-effective, allowing wider recruitment, and convenient for both researchers and participants (41). However, there are

notable disadvantages associated with its use. We encountered a technical issue in which one participant could not complete their Q-sort because a button would not appear on their screen. Fortunately, they made a screenshot and emailed it to us. We also encountered participants who provided superficial or unclear answers to the open-ended questions after the Q-sorting procedure. For those that had agreed to the interview, we could ask questions to clarify and deepen their answers at a later time.

Last, we conducted the interviews after all Q-sorts had been completed. This meant a delay between Q-sorting and the interview between 14 and 64 days. Although showing statements and their positions on the grid served as a reminder for participants in the interviews, they sometimes were searching their memories for reasons why they placed a statement in a specific place. In a future study with the same (online) design, we would reduce the time between Q-sorting and interviewing.

Conclusion

This study showed changes in students' appreciation of small-group active learning over time, along with development of epistemic beliefs and approaches to learning. These findings contribute to the study of active learning in medical education because they highlight the development of students as they advance through their studies. What motivates and engages first-year students is not necessarily what is motivating and engaging for students in later stages. Our findings support the development of interventions that can help teachers to teach in active learning settings. Furthermore, this study provides an additional way to study change in subjectivity. The formulated guidelines can help future Q-researchers with a repeated measures design.

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CHAPTER 4

Medical student engagement in small-group active learning: a stimulated recall study

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ABSTRACT

Background

Active learning relies on students' engagement with teachers, study materials, and/or each other. Although medical education has adopted active learning as a core component of medical training, teachers have difficulties recognizing when and why their students engage or disengage, and how to teach in ways that optimize engagement. With a better understanding of the dynamics of student engagement in small-group active learning settings, teachers could be facilitated in effectively engaging their students.

Methods

We conducted a video-stimulated recall study to explore medical students' engagement during small-group learning activities. We recorded one teaching session of two different groups, and selected critical moments of apparent (dis)engagement. These moments served as prompts for the fifteen individual semi-structured interviews we held. Interview data were analyzed using Template Analysis style of thematic analysis. To guide the analysis, we used a framework that describes student engagement as a dynamic and multidimensional concept, consisting of behavioral, cognitive, and emotional components.

Results

The analysis uncovered three main findings: 1) In-class student engagement followed a spiral-like pattern. Once students were engaged or disengaged on one dimension, other dimensions were likely to follow suit; 2) Students' willingness to engage in class was decided before class, depending on their perception of a number of personal, social, and educational antecedents of engagement; 3) Distinguishing engagement from disengagement appeared to be difficult for teachers, because the intention behind student behavior was not always identifiable.

Discussion

This study adds to the literature by illuminating the dynamic process of student engagement and explaining the difficulty of recognizing and influencing this process in practice. Based on the importance of discerning the intentions behind student behavior, we advise teachers to use their observations of student (dis)engagement to initiate interaction with students with open and inviting prompts. This can help teachers to (re-)engage students in their classrooms.

INTRODUCTION

Student engagement is recognized as an essential yet difficult to achieve aspect of small-group active learning in medical training (1–4). Students who engage more, learn more (5–7). However, it can be difficult for teachers to recognize when and why their students engage or disengage in their classrooms, and to interact with students in ways that optimize engagement (4,8–10). If we could gain more insight into the dynamics of student engagement in small-group learning activities, teachers could be facilitated in effectively engaging their students in these settings.

In health professions education, many schools have reformed their teaching and learning approaches to support active learning. Active learning requires students to become actively involved in the learning process (11). Although not definitively or unequivocally, reviews generally support the effectiveness of active learning in various health professions education curricula, like problem-based learning (5,12,13), case-based learning (5,14,15), and team-based learning (16–18). One of the reasons why active learning is effective is student engagement (2,19,20). Schools using active learning, need to create settings in which students can engage with teachers, peers, and study content to construct their own knowledge (21–23).

Teachers play an important role in stimulating the engagement of their students (4,8,9). They can motivate their students for engagement (24,25), monitor and guide the learning process(26,27), and initiate reflection on the value of engagement (8,28). Students report, however, that teachers may lack the knowledge, skills and attitudes to do this effectively (8,9). Teachers, at the same time, may attribute a lack of students' engagement to student characteristics, like low motivation, preparation, ability, confidence, or interest (9,29–31). For teachers to be effective in stimulating engagement, they need to understand what engagement really is and how it can be observed in practice.

As active learning often requires students to voice their thoughts and collaboratively try to find answers, verbal participation is understood as a good indicator of engagement (29,32,33). The amount of verbal participation can sometimes count towards the grade of a course, or even be part of professional behavior assessments (31,33,34). The absence of verbal participation, or silence, is consequently perceived as a sign of disengagement. However, silence can be a sign of engagement, for example when students think quietly about a question, analyze a problem, or carefully listen to others (30,32). Likewise, student use of electronic devices (e.g., smartphones or laptops) in the classroom is easily understood as a sign of disengagement (35). However, electronic device use can be a sign of engagement, for example when students look up information or save information for later use (36). Therefore, we need to expand our understanding of student engagement, so that teachers can better recognize when and why students engage or disengage in their classrooms, and use that information to optimize the interaction with their students.

Fredricks, Blumenfeld, and Paris (37) have described a framework that may help to expand our understanding of student engagement in medical education. They propose that student engagement is a multidimensional concept that includes behavioral, cognitive, and emotional components (37). Behavioral engagement describes the learning-related conduct of students. It is concerned with the activities that students participate in, for example verbal participation in class, but also completing homework, and complying with the rules of a class. Cognitive engagement describes the willingness and effort that students put in to learn the content of a course. It is concerned with (self-regulatory) learning strategies, like paying attention in class and use of metacognitive skills (planning, monitoring, and evaluating study approaches). Emotional engagement describes the feelings that students have towards study content, teachers, and peers. It is concerned with affective reactions, like interest in the content and sense of belonging. Likewise, Fredricks et al. (37) also describe behavioral disengagement (e.g., being late or disturbing other students), cognitive disengagement (e.g., redefining parameters for assignments to make it easier or being distracted from the learning process), and emotional disengagement (e.g., boredom or feelings of loneliness). In other words, student engagement is how students behave, think, and feel (37).

In this study, we will research three currently unknown aspects of the student engagement framework to achieve our aim of a) better recognizing when and why students engage or disengage in small-group active learning settings and b) positively influencing this process. First, according to the framework, the three dimensions of engagement are dynamically interrelated within an individual. However, it has not yet been described how this relation can be identified or observed in practice. Second, in-class student engagement results from a variety of personal, social, and educational antecedents (i.e., factors that influence engagement). However, it is unknown how these antecedents jointly influence the engagement in a classroom. Third, the framework describes engagement as malleable. However, the framework does not provide an explanation for the difficulty that teachers experience in engaging their students.

Therefore, we sought to answer the following research questions:

1. How do the three dimensions of student engagement interrelate in a classroom setting?
2. How do antecedents of student engagement influence student engagement in class?
3. How can the multidimensional view of student engagement help us to understand why it can be difficult for teachers to engage their students?

METHODS

Study design

Given the nature of the research questions, we needed data on how engagement occurs in real time and in a natural setting. Therefore, we conducted a video-stimulated recall study to research medical students' engagement in a small-group active learning setting. Video-

stimulated recall enhances (one-on-one) interviews with video recordings of behavior to stimulate participants' recall and reflection on critical moments (38,39). The video recording adds depth to the interviews by allowing participants to 'relive' events (40).

Research team and reflexivity

The authors were all educational researchers, most working within the medical curriculum of Vrije Universiteit Amsterdam. The interviews were conducted by experienced faculty developers (JG and AC) and colleagues from the Research in Education team. Students and interviewers did not know each other before the interview. Students were informed that neither their tutors nor anyone else from the medical program would receive any information about their participation in the interviews. MMV was the coordinator of the educational theme 'Professional Behavior' at the time of the interviews, and as such could be known by students. She, therefore, did not participate in the interviews, but only read the anonymized transcripts. All authors were convinced of the value of student engagement in the medical curriculum.

For this study, we adopted a social constructivist epistemological stance. We sought to understand the meaning that participants gave to their (learning) experiences, and used those experiences to gain insight into student engagement. We took an active role in making sense of the data in the light of our research aims.

Participants and setting

We invited 'study groups', not single students, to participate in this study, as we were interested in student engagement in small-group learning activities. By interviewing students from one group, we were able to explore how differences between students' perceptions in the same environment influenced their engagement. Study groups in the Bachelor phase of the Faculty of Medicine, Vrije Universiteit Amsterdam consist of maximum twelve students who meet twice per week for two hours, and employ a case-based collaborative learning approach. Students stay in the same study group, guided by the same tutor, for the duration of a semester. During the first meeting of the week, students brainstorm about patient cases and associated assignments. After the meeting, they finish the assignments in subgroups and prepare to present their findings at the second meeting of the week. The students assume the different roles of chair, feedback provider, presenter, and note-keeper in rotation. Tutors observe the process and students' individual contributions and act only if needed. Tutors also evaluate the professional behavior of their students. We decided to recruit second-year study groups, as they have experience with the design and expectations of study groups, can compare across multiple study groups of which they were a member, and can reflect on the approaches of multiple tutors.

Procedure

We approached study groups through their tutors. Students could object or agree to the video recording, and students could object or agree to the interview. We only included

a study group if all students in that group agreed to the video recording. Students who additionally agreed to the subsequent interview were scheduled for an interview within 1 week after the recorded meeting. Interviews took place in a classroom on the university campus.

When a study group agreed to the video recording, we recorded one of their meetings in full. From that recording, we selected moments of students showing either signs of participation or non-participation in the learning process (e.g., asking or answering a question, staring out of the window, students having a private conversation between themselves). We recorded the meetings in June 2019, so before the COVID-19 pandemic and in a face-to-face situation. For each student, at least one moment of participation and non-participation was selected. In line with stimulated recall research recommendations (41), we watched the selected moments with the students in individual interviews as soon as possible, but no later than one week after the meeting. The moments we selected were directly related to the research questions, that is showing observable signs of (non-)participation, to stimulate best the student's recall of that specific moment of the meeting. We chose to do individual interviews after recording a group meeting, as individual interviews are better suited to gain an in-depth understanding of an individual student's perspective, while creating a safe space for the student for reflecting on his/her behavior. The interviews were semi-structured in nature and guided by a list of questions (Appendix 4.1). We asked open-ended questions to stimulate recall of the student's behavior, thoughts and feelings at that time. Students were also invited to select a certain moment of the meeting to review during the interview and offer any other thoughts about the meeting and their behavior in it, or their engagement in general. All interviews were audiotaped, pseudonymized and transcribed for analysis.

Analyses

We analyzed the transcripts using the Template analysis style of thematic analysis, and followed recommended procedures (42–44). ATLAS.ti version 8.4.18.0 was used to aid the data analysis. Analysis was done in three steps.

1. Familiarizing ourselves with the data. In the first step of the analysis, researchers JG, MMV and AC familiarized themselves with the data by reading two transcripts and carrying out inductive preliminary coding.
2. Creating, revising and applying coding template. Based on a discussion among the three coders, we agreed that Fredricks, Blumenfeld and Paris' student engagement framework seemed appropriate to guide further coding of the data. We used the data from step 1, as well as the framework, to create a tentative coding template (37). The framework was thus used as a sensitizing concept (45). Three transcripts were coded with this template by JG and MMV. Using data from the interviews, we expanded and clarified the template based on discussions in the author team. We also formulated explanatory descriptions of coding categories. This expanded template was used for two more transcripts to establish intercoder agreement. Table 4.1 shows the finalized

coding template, which ultimately was the result of a combination of deductive and inductive strategies.

In the last step of the coding process, JG and MMV divided all transcripts and applied the final template. Throughout the analysis, JG and MMV discussed and resolved questions about the transcriptions, uncertainties about coding, and potential text fragments not fitting the template. AC advised when necessary to resolve a question or uncertainty.

3. Theme development. Themes were collaboratively constructed "through analyzing, combining, comparing, and even graphically mapping how codes relate to one another" (43). Authors MMV, JG, and AC held multiple discussions to evaluate the fit and support of each constructed theme in the data. Finally, the full author team reviewed the themes to evaluate the degree to which the research questions were answered.

Table 4.1. Coding template for analysis

Components of engagement	Explanation	Illustrative quote
Behavioral engagement		
Verbal participation	Student speaking in class	"If I notice the answer from a fellow student is incomplete, and I know that I am able to give the full answer, then I would say something."
Non-verbal participation	Student showing non-verbal behaviors indicating their engagement, e.g., by nodding, pointing or looking at peer who talks	"I nodded, because I heard that in the lecture."
Completing homework	Student showing they did their homework, e.g., by referring to their notes or questions prepared for the meeting	"It can be useful to look things up before the meeting, because you might be able to ask good questions that help others onto the right path."
Complying with rules	Student behaving as expected, because they are following the rules of the class, e.g., by taking the role of chair	"I was mainly taking notes of what fellow students had said."
Other compliant behavior	Any other observable signs of behavioral engagement, e.g., by volunteering to do extra task	"This is the second semester of the second year, so I have been the student chair 4 times. And this semester I volunteered to do it a second time, which made it the fifth time, and I thought it went the best of all times."

Table 4.1. Coding template for analysis (continued)

Components of engagement	Explanation	Illustrative quote
Behavioral disengagement		
Being late	Students being late for class	"It is because I was late for the meeting and thought it would be rude to use my phone."
Interfering with others' work	Students distracting their peers, e.g., by having a private conversation	"I am often that person who says something funny when we are working seriously, and causes everyone to be distracted."
Non-participation	Students not participating in learning activity, but also not actively disrupting their peers, e.g., by staring out window	"I sometimes think… that a question has been answered, and then I sort of 'shut off'. I just start looking around."
Other disruptive behaviors	Any other observable signs of behavioral disengagement, e.g., by not going to class	"I might be listening here, but I am also doing my nails."
Cognitive engagement		
Autonomous motivation	Students wanting to engage out of a sense of importance, fun, or interest	"When you say something controversial, people have to defend their answer. And then you get some more motivation, which helps when you have to explain and present an assignment"
Substantive engagement	Students being committed to learning the study content, e.g., by using metacognitive learning skills	"Some assignments are difficult. As chair, you realize you need to guide the discussion more and so you prepare better, so you can ask the right questions to help the others find the right answer."
Other contributing thought processes	Any other cognitive contribution to the learning process, e.g., by giving feedback to peers, deciding not to bring laptop because it distracts when present	"I like it when one person is designated to observe the chair for the full meeting, and then give their feedback at the end."

Table 4.1. Coding template for analysis (continued)

Components of engagement	Explanation	Illustrative quote
Cognitive disengagement		
Controlled motivation	Students not wanting, but having to engage because it is enforced, e.g., by tutor or rules of the program	"I only go to meetings because I have to."
Procedural engagement	Students trying to complete the task requirements with other aim than learning from it, e.g., finish the class early	"When a question was more difficult, they would be like 'let's skip this one and let the subgroup doing the presentation figure it out'."
Other non-contributing thought processes	Any other cognitive process not contributing the learning process, e.g., not paying attention, deciding not to ask a question because they will learn it another time	"I was confused because I thought I was right. So I was thinking 'either they don't understand, or I don't'. So I wrote in the notes 'look into this later'."
Emotional engagement		
Relatedness/ belongingness	Students' positive affective reactions to the group and tutor, e.g., by having fun, sense of belonging, making jokes	"Our group is a very sweet one. We care for each other."
Positive emotions	Students experiencing positive emotions, e.g., happiness	"I think that people are laughing, because the first couple of times it happened, I would also laugh really loud."
Other positive feelings	Any other positive affective reaction to the learning environment, e.g., feelings of curiosity or general contentedness	"I never felt really unpleasant or unsafe or thought that I couldn't say what I wanted to say."
Emotional disengagement		
Alienating/ distancing	Students' negative affective reactions to the group and tutor, e.g., by not feeling like a part of the group, not understanding inside jokes	"Sometimes when I say things, they give me these looks you know."

Table 4.1. Coding template for analysis (continued)

Components of engagement	Explanation	Illustrative quote
Negative emotions	Students experiencing negative emotions, e.g., anxiety	"When people respond to what has been said, but they have no idea if it is right, it is just very frustrating."
Other negative feelings	Any other negative affective reaction to the learning environment, e.g., feelings of indifference or boredom	"Sometimes they are long-winded, then I just sit there 'okay, I don't care'."
Antecedents of engagement		
Course design	Everything to do with how the course and study group meetings have been designed, e.g., assessments, responsibilities of students and tutor	"I mean, it's like you read the assignment and the learning objectives are there as well, and then the question starts. But based on those learning objectives, if you get a case of a patient with certain complaints, and the learning objectives say: know the symptoms and treatment plan of acute otitis media, ..."
Study group	Everything to do with group processes, e.g., collaboration, agreements, taking breaks	"In the beginning of a study group you always need to see what other people are like, but fairly quickly some bonding occurs."
Learning beliefs	Everything to do with students' personal beliefs about learning, e.g., appreciation of small-group active learning	"The best and most efficient way to learn is to do the exam first, to know what they are asking there, and when you then go and study, to recognize questions from the exam, so you can read it again."
Learning strategies	Everything to do with activities that students use, and combinations thereof, to stimulate their learning	"[Why do you go to the group meetings?] To try to apply my knowledge. And to rehearse what I already knew."
Non-school activities	Everything to do with (potentially conflicting) non-school activities that students engage in, e.g., jobs, sports	"He had a drink yesterday, so he was rather tired, which you can see because he nearly falls asleep the entire time."

Table 4.1. Coding template for analysis (continued)

Components of engagement	Explanation	Illustrative quote
Other school activities	Everything to do with (potentially conflicting) other school activities, e.g., other classes, exams	"I didn't have a lot of energy, because we just had a break for a couple of hours after an exam. And I studied hard in the morning, and afterwards didn't really feel like doing anything. And that also didn't make me have a lot of energy for a brainstorm."
Prior knowledge	Everything to do with the prior knowledge and experiences of students	"Well, I notice that, for example with the topic of antibiotics, we just had a lecture about that, and I knew a lot about it. And then I want to engage more because I am like 'okay, I know something about it'."
Tutor	Everything to do with the tutor, e.g., their behavior, their content expertise	"Having or not having a tutor with a medical background has a big influence on discussions. Because last period we had a tutor with a research background and the topic was medical research, and he had a lot of input, and you are discussing longer, and more focus is being put on the process towards the answer. And that is why last period, those study group meetings were so unbelievably good."

We reached theoretical sufficiency after including two study groups and conducting fifteen interviews: data from the last interviews did not require modifications of the identified categories (46,47). Furthermore, all authors agreed the sample was adequate and appropriate, and the data were rich enough to answer the research questions (46).

Ethical aspects

The Ethical Review Board of the Netherlands Association for Medical Education approved the study (dossier number 2019.2.7).

RESULTS

Three study groups were invited to participate. Two study groups agreed and fifteen individual interviews were conducted. Four students agreed to the video recording, but declined an interview. We will first report on the relationship between the dimensions of engagement (RQ1), then on the influence of antecedents on in-class student engagement (RQ2), and finally on the difficulty for tutors in engaging students (RQ3).

Relationships between dimensions of engagement: Spirals of engagement

Students reported to engage and disengage multiple times during a meeting. Students engaged for a variety of reasons, mainly out of interest for a topic or having prior knowledge that could add to a discussion. Students also tended to engage when their tutor or peers demanded it. Interestingly, we identified a pattern in the interviews that once a student engaged on one dimension, other dimensions were likely to follow. In other words, engagement seemed to build upon itself, creating a 'spiral-like pattern of engagement'. The following quote illustrates this finding:

> *[Interviewer and Student watching a part of the video recording in which the student was asked to read a patient case aloud and answer a question about it]*
> *Interviewer: How do you feel about being asked to answer that question?*
> *Student: I don't mind that. I notice I am touching my face a lot. When I am thinking about something... like at an exam, I always touch my hair and I look down, but apparently, I also do it when I am thinking in the group.*
> *Interviewer: So you were really thinking here?*
> *Student: Yes, I was really thinking here. And of course, when someone else says something then I am listening and thinking 'yeah that's true'. [...]*
> *Interviewer: How did you feel about other people also answering here, while you were still thinking?*
> *Student: I liked that. Because if you don't know the answer, and nobody says anything, we would not get anywhere. You would say 'I don't know' and then someone else would get a turn or someone else would say something eventually. [...]*
> *Interviewer: So you are okay with people jumping in when they do know?*
> *Student: Yes, otherwise I would look like a fool for creating a silence, wouldn't I? (Student 5)*

In this quote, a prompt for verbal participation (reading the patient case out loud – behavioral engagement), started a cognitive process in which the student would think about the question and the answers from his peers (cognitive engagement), and elicited positive feelings about the group (helping him and avoiding negative feelings about himself – emotional engagement). In another interview, a student reported how she had strong feelings about a certain topic (emotional engagement), and how this led her to be more verbally active during the case discussion (behavioral engagement), and also more attentive to hear others' point of view (cognitive engagement). Other interviews demonstrated this

same spiral-like pattern of engagement. We did not identify a certain order in these spirals, and they could start from any dimension.

The opposite, a spiral-like pattern of disengagement, was also identified in the interviews. Students who reported to disengage on one dimension, reported to consequently disengage on the other dimensions as well. Thus, disengagement also seemed to build upon itself. The next quote illustrates this finding.

> *Student: I don't like study group meetings. I would rather study on my own. That would be a more effective use of my study time. [...] So I only go to study group meetings because they are mandatory.*
> *Interviewer: That is all? No other purpose for you to be there?*
> *Student: No there isn't. I do not learn much from the meetings, because they are not going to my desired pace. Collaborating like this doesn't work for me. It's too slow and there is too much distraction in a large group. [...] Also, all the questions are based on the lectures, and they assume you go there. But if you haven't gone, you can automatically not answer the questions properly. So yeah, then it is just brainstorming with the rest of the group, but then I don't have much to contribute.*
> *Interviewer: Is there anything the tutor could do to help you contribute or to partake more actively?*
> *Student: No, I don't think so. (Student 7)*

In this quote, the student described how his dislike of the study group meetings, resulted in merely being present at the meetings because he had to, and not out of a motivation for learning. Finally, because of his emotional and cognitive disengagement, he also disengaged behaviorally.

Influence of antecedents of engagement: Willingness to engage

Students reported how their engagement varied across meetings. They indicated a number of factors that influenced whether they would be more or less likely to engage during a meeting (Table 4.1). Each of these factors could have a stimulating or limiting effect on their engagement. However, from the interviews we came to understand that the combination of these factors jointly influences how willing to engage a student will be during a meeting. The following quote gives a clear insight into how before-class factors jointly influenced a student's willingness to engage:

> *A large part of the study group is focusing on the questions and answers. Because the questions and answers will be part of the exam. And, in my opinion, passing the exam is not the most important. The most important thing to me is to be able to apply the knowledge you have. [...] And that is what you could see [in the video recording]. What I am trying to do, is to say something controversial, [...] so that the others actually start to think. On the one hand I am trying to stimulate them to think outside the box, but on the other hand I try to motivate them to say*

> *what they think. Because every now and then I have a different opinion than they have. And when you give that opinion, and they defend theirs, only then do you start thinking. Because you can simply say "no it's not like that", but I won't accept that – I will ask them "why not?" And when they start explaining, then I can start to understand it. (Student 3)*

In this quote, the student described how other students in his study group would be satisfied when they reached the answer to a question, but he often felt he did not understand why that answer was the right answer or that he had another opinion. His learning beliefs included that discussing answers with peers leads to better understanding. So, his learning strategies included challenging his peers to explain the content to him to advance his understanding. This was possible given the highly interactive nature of the study group meetings. This quote shows how antecedents jointly influence the students' willingness to engage with his peers during a meeting. It is the result of the combination of stimulating and limiting factors.

Additionally, antecedents seem to have a dynamic influence. Students reported how their engagement varied from meeting to meeting, depending on their perception of the antecedents beforehand:

> *Study group meetings vary in how engaging they are. It has to do with the content. For example, last period we learned about medical research, and everybody knows very little thereof, everybody thinks it's not so interesting, and then the levels of engagement drop. The meetings become less instructive. And content which everybody likes, then you learn a lot and yeah you participate more. (Student 1)*

This quote illustrates that students anticipate or reflect on upcoming meetings and that antecedents do not have a fixed or static influence on student engagement.

Tutor difficulty: Distinguishing engagement from disengagement

Students found it difficult to stay engaged for longer periods of time, especially when they did not think the topic was interesting, the questions were perceived as too difficult, or when the meeting was at the end of a day. They indicated a role for the tutor to stimulate, maintain, and regulate their engagement. As one student put it:

> *Our study group meeting is from 3.45-5.45PM. Well, I had to work in the morning that day, so I got up at 6.30AM. Then I am not at home the entire day, and then I need to walk in the classroom at 3.45PM. Yeah, you are just tired then [...] I think I also had a drink the day before, so I was not feeling very well. So yeah, it all piles up and you just get tired. But I could get myself to do something you know, that is not a problem. But you get the feeling that after a while everybody feels like "guys, we could also skip the last assignment?" You get that feeling after a while, and then the tutor is very handy to sort of, redirect us. (Student 12)*

Students reported that interventions from all three dimensions of engagement would help. Tutors could stimulate them through their behavior (e.g., remind them of the rules or read a case out loud), their cognitions (e.g., ask them a question), or their emotions (e.g., have them reflect on their personal stance towards a patient).

However, students reported that, in their eyes, tutors sometimes had difficulty distinguishing engagement from disengagement. Student behavior, looking outwardly the same for tutors, could have different intentions. One student gave an example of this difficulty, when his behavior of grabbing and using his smartphone was misinterpreted by the tutor:

> *Student: I am only on my phone when I am looking up something. But I have heard from [tutor] that I grab my phone too often. But sometimes they [peers] say something during the meeting and I just want to look it up. Because they look like they are searching on their laptop, but they are just sending messages through WhatsApp, while I am looking up what we are talking about [...].*
> *Interviewer: So what you're saying is that a tutor cannot distinguish between reasons why you grab your phone?*
> *Student: Yes, exactly. (Student 4)*

Therefore, although behavior is observable, it can be difficult for tutors to accurately assess the intention behind the behavior. That makes it difficult to assess if the behavior fits engagement or disengagement, and if an intervention is required.

For the student above, the intervention of the tutor (give feedback on phone use) actually led to emotional disengagement within the student (negative emotions, being misunderstood), cognitive disengagement (reducing his intentions and effort for learning from the meetings), and behavioral disengagement (not looking up information anymore).

The same difficulty of accurately assessing intention was observed for cognitive engagement:

> *Interviewer: At a certain point I heard the tutor asking if you wanted a break.*
> *Student: Yes. Sometimes we have a small break in between, especially after a very long assignment. Then everybody agrees to take a break. But usually everybody is like "let's get this done as quick as possible." So we don't really take breaks.*
> *Interviewer: So at a certain moment some sort of exhaustion arises, and you need a break. Even if you want to give your best and engage, you cannot do so for two hours non-stop?*
> *Student: True. But the thing is, a group meeting officially lasts two hours, but we don't actually need two hours. And we have a couple of people in our group who are like "okay let's rush through this" [...] And the idea is that 'if we are done early, we can leave early'. (Student 6)*

This quote shows that students keep working on the assignments, not for the sake of learning, but for the sake of ending class early. While it might appear students are cognitively engaged, they actually are disengaged. Students' intentions here are again important.

Verbal participation and silence were both reported as a sign of engagement and disengagement. Also here intention was important. Verbal participation was reported as a means to contribute to the collaborative learning process, but also as a means to finish the class quickly. Silence was reported as a means to improve understanding of difficult topics (e.g., listening to peers), but also as a sign of not paying attention. However, students described how their tutors seemed to view verbal participation as good and silence as bad. Silent students were urged to '*speak up more*' (Student 12) by their tutor. Talkative students reported that they received feedback that they '*participate well*' (Student 9). This indicated to students that silence was perceived as a sign of disengagement. Students reflecting on their silence indicated that their silence often meant they were '*thinking about questions*' (Student 2) and '*curious to hear other people's perspectives*' (Student 8). They also did not '*want to repeat what another had said*' (Student 8) or '*speak up when they were not sure enough about something*' (Student 2).

DISCUSSION

This study uncovered three main themes that illuminate the dynamic process of student engagement and explain the difficulty in recognizing and influencing this process in practice. First, the spiral pattern of student engagement and disengagement shows how the three dimensions of engagement interrelate in classroom settings. We found that when students engage or disengage on one dimension, other dimensions are likely to follow suit. The engaged become more engaged, and the disengaged become more disengaged. Second, students' willingness to engage in class is dependent upon their perception of engagement antecedents before class. It is the combination of these antecedents that jointly influences the likelihood of a student being engaged during a meeting. Third, distinguishing engagement from disengagement can be difficult, as behavior can outwardly look the same for tutors, but have very different intentions. The intentions determine if a student is engaged or disengaged.

Recognizing student engagement in a classroom

Teachers look for indicators of engagement in the behavior of students. The amount of verbal participation and use of electronic devices are common examples (29–36). This study illustrates how behaviors are preceded by intentions, and the intentions determine if behavior fits engagement or disengagement. Students who are silent because they want to learn from their peers, are engaged. Students who verbally participate because they want to end class early, are disengaged. Students who type on their smartphone to look up information, are engaged. Students who type on their laptop to text a friend, are disengaged. Thus, in order to recognize student engagement, teachers need to look beyond the behavioral dimension of engagement.

The combination of behavior, cognition, and emotion is what defines engagement (37). The difficulty for teachers is that they can observe the behavioral dimension of engagement, but

not the cognitive and emotional dimensions as these are internal to students. Furthermore, this study illustrated how student engagement is a dynamic process. Students can engage or disengage on any or all of the three dimensions, and this study showed they do so multiple times during a two-hour meeting. Moreover, student engagement levels vary from meeting to meeting. This complicates recognizing engagement.

A recent review on disengagement acknowledges how difficult it is to accurately identify student disengagement (48). In the review, it is suggested to define standardized measurable indicators of disengagement and transform those in a 'checklist of engagement'. We, however, would argue against such a course of action. As checklists for reflection can create 'reflective zombies', we would fear for 'engagement zombies'(49). That is, students who are conditioned to behave in a certain way rather than truly engaging with the course content, teachers, and fellow students. Therefore, we recommend teachers to look at the contributions that students make to the learning objectives of a meeting and group dynamics. Engaged students contribute to achieving the learning objectives and positive group dynamics. Disengaged students do not.

Stimulating engagement

Based on our results, we reiterate the finding that teachers play an important role in stimulating student engagement (4,8,9,24–28). However, as described above, influencing in-class engagement can be difficult for teachers because it is difficult to recognize in practice. Additionally, as found in this study, an incorrect judgement of a student's engagement can actually increase disengagement.

This study adds three suggestions to the literature for teachers to have a positive influence on their students' engagement: 1) initiate spirals of engagement; 2) address the (modifiable) antecedents; and 3) focus on the intentions behind student behavior. Adhering to these suggestions may help to optimize student engagement in active learning settings (8,9).

1) To initiate a spiral of engagement, tutors can make use of the multidimensional view of student engagement and the finding that students respond well to interventions from each dimension. Teachers can thus use students' behavior, cognitions, and emotions. Examples from this study are asking students to read a patient case out loud, asking open-ended questions about the content, and having students reflect on their feelings.

2) To stimulate willingness, tutors can reinforce engagement-supportive antecedents, and discuss or challenge engagement-limiting antecedents. Examples from this study are to explore students' thoughts and feelings about the content of a course, students' prior knowledge, and the learning process. Teachers could increase willingness by discussing the relevance of the content, how to gain adequate prior knowledge to be able to participate, and how the learning process will help them achieve the course objectives. A limitation here is that teachers cannot address all antecedents, as some might be unknown to teachers

or be defined by course designers or educational policy. Therefore, we suggest teachers to focus on the antecedents that are modifiable.

3) The suggestion to focus on the intention behind behavior warrants a little elaboration. Intention is not always directly observable for teachers. It has to be inferred from observations and cues related to the learning and group process. Oftentimes, observable behavior (like silence and use of electronic devices) is used to form negative judgments of students (9,29–32,35,36). However, as we confirmed in this study, the same behavior can fit both engagement and disengagement. The student's intention is what matters. Teachers can therefore make better use of their observations by prompting students to engage and learn their intentions at the same time. A prompt for teachers could be: 'I see you listening attentively to the discussion. What are your thoughts?' or 'I see you typing on your laptop. What did you find worthwhile from this discussion to take note of?' Such an approach would fit well with previously identified student preferences for small-group learning environments, in which a teacher creates a positive, non-threatening group atmosphere and at the same time gains information about students' engagement (26,50). Making use of open and inviting prompts could also help to avoid situations in which teachers would make incorrect assumptions about students' (dis)engagement.

Strengths and limitations

Video-stimulated recall depends on the recall of events. Therefore, we interviewed students as quickly as possible after the recorded study group meeting. However, due to logistic reasons some interviews were held several days after the group meeting. Although the video did improve recall, some students reported to have difficulty recalling their thoughts. Additionally, we acknowledge that the interviews themselves were a conversational setting which might have led students to express themselves in a certain way and in another setting might have answered differently. However, in line with our social constructivist stance, the interviews allowed us to co-construct knowledge with the participants by gaining insights into the thinking behind behavior, thoughts and feelings (51).

In line with our finding that distinguishing engagement from disengagement can be difficult, we had the same experience during the data collection. When we showed the selected moments to students during the interviews, we did not provide a reason for selecting that moment. For example, when we selected a moment on video we thought showed disengagement (student looking out the window), the student would elaborate on how he was engaged (thinking hard about a specific bias in research). The reverse also happened (student being disengaged while the researcher assessed the student to be engaged from the video recording). This strengthens our finding that it indeed can be difficult for teachers to distinguish engagement from disengagement.

Future research

Tutors might want to learn how to best initiate a spiral of engagement. Within engagement it is possible to identify qualitative differences (37). Emotional engagement, for example, can range from simple liking to deeply valuing a topic. Cognitive engagement likewise can range from simply remembering to creating new knowledge. It is likely that higher qualities within each dimension have a better chance of initiating a spiral. Secondly, students have suggested that teachers play an important role in stimulating, maintaining, and regulating engagement. However, students also reported responding well to prompts from peers. If peer prompts have a greater chance of initiating a positive spiral, this could influence how teachers design their small-group learning activities. A study in which students are asked about their responsibilities regarding their engagement might include questions about the design of learning activities.

CONCLUSION

This study illuminates the dynamic process of student engagement and explains the difficulty of recognizing and influencing this process in practice. Teachers can use the insights and suggestions gained from this study to optimize the engagement in their classrooms. With higher engagement, small-group active learning will be a more pleasurable and instructive form of education for both teachers and students.

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Appendix 4.1. List of questions to guide the interviews

Structure of interviews	Example questions
1. Warm-up questions (Goals: getting comfortable; activating memories from meeting; identify any special circumstances that influenced that meeting)	- How did you experience the study group meeting? - How would you describe your contribution to the study group meeting? - What made it 'same as always', or what made it 'different than other times'?
2. Show selected moments from recording (Goal: stimulate recall and reflection)	- Can you tell me what you see happening in this moment? - What did you do, what did others do? - What were your thoughts in this moment? - What made you decide to behave/think/feel the way that you did? - What is your opinion on what happened? How did that make you feel? - Does this happen more often in meetings? Is this what you want, or think is important? - Looking back, would you have wanted to act differently? Why? What would you have needed for that to happen?
3. Engagement in general (Goal: reflect on representativeness of watched moments and antecedents of engagement)	- Do the moments we have watched and discussed together give a good impression of the study group meetings and your contributions? - Is there another moment you would like to watch? - In general, are you able to engage meaningfully in the study group meetings? What helps and what hinders? - How does the tutor help you to contribute to the study group meetings?

CHAPTER 5

Learning from the experts: stimulating student engagement in small-group active learning

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ABSTRACT

Introduction

Engaging students in small-group active learning methods is essential for their development. Yet, medical teachers frequently face difficulties in stimulating this engagement, resulting in students remaining passive or detached from the learning process. The aim of this study was to uncover ways in which expert medical teachers, proficient at cultivating high levels of student engagement, stimulate such engagement. This knowledge might inform faculty development initiatives, so that medical teachers can be better equipped to teach in a way that engages students.

Methods

We conducted an interview study using a constructivist grounded theory approach, integrating elements from appreciative inquiry. The eleven participants were qualified medical teachers who repeatedly received high scores on student engagement. Each interview was transcribed, coded, and analyzed using constant comparison until theoretical saturation was achieved.

Results

We constructed a grounded theory of expert teaching practice, describing student engagement as an integrated process consisting of three components: 1) Aiming for a supportive learning environment; 2) Employing a personal educational approach; and 3) Facilitating the active learning process.

Discussion

This study uncovered that there are multiple ways to stimulate high levels of student engagement. Although there was consensus on the importance of a supportive learning environment and the ability to facilitate the active learning process, participants recognized the contextual nature of student engagement and took on a reflective mindset to adapt strategies to their specific situations. These findings highlight the need for faculty development initiatives to adopt a comprehensive, context-sensitive approach that considers the complexity of student engagement.

INTRODUCTION

Small-group active learning methods, which involve interactive student-centered activities, can improve medical students' knowledge, skills, and personal and professional competencies when they stimulate student engagement (1,2). Student engagement, more recently also called learning engagement (3), has been conceptualized as the cognitive, emotional, and behavioral aspects of students' involvement in learning activities (4). When students engage in interactive and constructive ways with the subject matter, their learning increases (5). In reviews describing the specific conditions necessary for student engagement in active learning methods, 'the teacher' is mentioned consistently as a determinant of success (6–11). Teachers need to be competent in cultivating a learning environment in which students can engage with each other and the subject matter to develop themselves. Students who perceive active learning to be poorly designed or executed by their teacher have been shown to disengage from learning (12,13). Therefore, for small-group active learning to be successfully implemented and contribute to student development, there is an urgent need for both novice and advanced medical teachers to improve their mastery in student engagement (14–17).

The challenges that medical teachers encounter when engaging their students seem to arise from various sources. First, teachers themselves have personal views on education, which may or may not align with active learning as an effective strategy, and which can affect how they approach their teaching tasks (15,18–20). Active learning requires specific teaching competencies that not all teachers may have developed (14,15,21). Second, student beliefs about learning and associated competencies may or may not align with active learning as an effective strategy, which can influence their behavior in class (14,17,22). Third, pedagogical and didactical issues may affect the conditions necessary for student engagement, such as class size and the amount of time available for learning activities (14,15). Finally, institutional challenges may limit the time that teachers can spend on teaching and professional development (15,23,24). When teachers fail to deal with these challenges, they have been shown to revert to more passive (i.e., less effective) ways of teaching (16).

To support medical teachers in engaging their students and dealing with associated challenges, faculty development serves as a critical resource (15,25,26). Through faculty development initiatives, teachers are instructed in strategies to positively impact student engagement. These initiatives can yield favorable knowledge, attitudes, and behavioral outcomes (21,27,28). However, these successes are not the end of the story. In practice, medical teachers continue to encounter difficulties in engaging students in their classrooms. Even experienced medical teachers with advanced knowledge, skills, and positive attitudes toward active learning face challenges when trying to implement the lessons learned from training (15). Thus, despite the effectiveness of faculty development in offering student engagement strategies, there is a need for additional understanding to support medical teachers in engaging their students.

Despite the reported challenges and insufficient support from faculty development, certain medical teachers have successfully implemented active learning and mastered student engagement. These 'experts' could possess valuable insights that could advance our understanding of student engagement. Currently, it is not known what these teachers do in their classrooms. In this study, we set out to learn how successful teachers approach their tasks.

Aim and research question

Our study aimed to construct a theory of student engagement in small-group active learning settings. This theory could inform faculty development initiatives so that medical teachers can be better equipped to teach in ways that engage students. Our guiding research question was: how do expert medical teachers stimulate high levels of student engagement in small-group active learning sessions?

METHODS

Research design

We conducted an interview-based study to explore how expert teachers stimulate high levels of student engagement. We used a constructivist grounded theory approach, which is a qualitative research methodology that seeks to understand social processes (29). It employs an inductive approach to theory development, with data collection and analyses occurring simultaneously in an iterative fashion, making use of constant comparison methods (30,31). We aimed to include participants who could contribute to the richness of the collected data (31). To enhance transferability, we carefully described the study context (32, 33).

Consistent with constructivist epistemology and the methodology, we viewed student engagement as a social construct shaped by experiences and contextual factors. This stance acknowledged our preconceptions and preexisting beliefs, while the constructivist grounded theory approach guarded against being solely determined by them.

We adhered to the GUREGT (Guideline for Reporting and Evaluating Grounded Theory Research Studies) to ensure the quality and rigor of our study and accurately report its process and findings (34).

Study population and setting

We defined expert teachers as individuals: 1) having obtained, or nearing completion of, a formal teaching qualification (nationally recognized, incorporating training in active learning and student engagement); and 2) attainment of a score of at least 4.0 (on a 1–5 scale) from minimum two study groups on student evaluations concerning student engagement.

In constructivist grounded theory, initial and theoretical sampling procedures are used to collect data (29). The participants, selected through purposive sampling, were eleven

expert teachers involved in a tutoring course offered by the Faculty of Medicine at the Vrije Universiteit Amsterdam (Table 5.1). This course is taught in all three years of the bachelor's program. Each year, approximately 150 teachers are involved, teaching 154 study groups, comprising a maximum of twelve students each. The course objectives are related to the integration and application of the knowledge, skills, and attitudes gained in lectures, labs, and other courses. Teachers meet with their study groups once or twice per week during a semester for two hours. Sessions involve a variety of learning activities based on patient cases. In years 1 and 2, the course employs a collaborative-case based learning approach in which the teacher's task is to guide the active learning process, while the students are responsible for learning the content and running the sessions. Teachers are not required to have a medical background. In year 3, the course employs a team-based learning approach, in which the teachers lead the sessions and are actively involved in discussing the content. Therefore, teachers in year 3 are required to have a medical background.

Consistent with the tutoring course design and its teacher population, participants were involved in all three years, bringing medical and other backgrounds to their teaching, as well as varied teaching experience. Constructivist grounded theory studies benefit from a diverse sample, as it enriches the depth and breadth of generated insights (29).

Table 5.1. Participant characteristics

Average number of study groups taught		12.2 (range 7-24)
Background	Medical	3
	Para- or nonmedical	8
Sex	Female	6
	Male	5

Data collection and analyses

The interviews were designed using elements from appreciative inquiry (35–38). Appreciative inquiry is characterized by interviews with a focus on 'what works well' instead of 'what is going wrong', resulting in participants speaking more openly and less defensively (37). Our questions reflected this method through our focus on participants' positive teaching experiences (instances of high student engagement), and collaboratively discovering what underlying processes contributed to those experiences. The interviews were semi-structured (see Appendix 5.1 for interview guide). Each interview was audio-recorded and transcribed for analysis.

We collected and analyzed data concurrently, using Atlas.ti version 22 (39) , field notes, and memos. Authors JG, SR, LB, and AC held analysis meetings every 2–4 interviews. We established coding practices to facilitate comparison and discussion of findings.

To start, we independently engaged in initial coding and identified possible patterns in the data. During the first meeting, we discussed preliminary codes and memos, and modified the interview guide. Focused coding followed, collaboratively refining codes and concepts that gave meaning to and explained larger portions of data. Through constant comparison, we compared new interviews to previous data, identifying contradictions, expansions, and support. We explored interactions between participant characteristics and the research question to identify their potential influence on the findings. Consequently, we could identify categories and themes with increasing specificity and precision, while also explaining links between the categories and themes through theoretical coding. This iterative process was continued until a stable thematic structure developed, visualized through diagrams and storyline procedures (29,31,40).

Theoretical saturation (i.e., additional data likely do not contribute new insights to the developing theory or categories) was taken as a measure to determine if the interviews had yielded the data needed to achieve our research aim (29,41). We achieved saturation after 11 interviews, after which we reached a sufficient and coherent conceptualization without any significant gaps (29,42).

Reflexivity

The authors have extensive knowledge of active learning through scholarship and their experiences as teachers and students in courses that employed active learning methods. AC, SR, and JG have extensive faculty development experience that might influence their findings, which were checked and discussed throughout with the entire research team. JG taught a teacher qualification course, through which he knew some participants before conducting the interviews. There was no active relationship between them at the time of the interviews. Participants were aware in advance that JG would be the interviewer and had the option to decline participation or request a different interviewer. RK is a teacher in the tutoring course, but not a participant in the study. Her experiences were discussed during team meetings and helped facilitate the conception and execution of this study. AC had experience in the methodology and guided the team through the study.

Ethics and consent

Ethical approval was obtained from the Ethical Review Board of the Netherlands Association of Medical Education (dossier number 2020.5.1). Before partaking in the interviews, participants received an information letter about the study, which they could read at their convenience. Then, if they agreed to participate, they signed an informed consent form, and the interview was scheduled. The participants did not receive compensation for participating.

RESULTS

Analysis of the interview data produced an expert theory of engaging students in small-group active learning. We identified three interacting components: 1) aiming for a supportive learning environment; 2) employing a personal educational approach; and 3) facilitating the active learning process. Given our comprehensive analysis of expert teachers' strategies for engaging students, the results do not detail concrete behaviors, instead offering a synthesized overview of reported practices and interactions between components.

1) Aiming for a supportive learning environment

Psychological safety

Participants consistently described how student engagement started with providing psychological safety. This meant that students felt secure, appreciated, and had a sense of belonging, enabling them to contribute, show vulnerability, be themselves, and make mistakes without fear of judgment.

Participants felt that psychological safety was essential in an active learning process. Students in the tutoring course were required to ask questions and provide answers even when they were not certain they would be correct, to give and receive feedback, to give presentations, and to experiment with new behaviors in order to develop new skills. To truly engage in such activities, students required this safety.

> *I think a safe atmosphere is the most important for engaging students. It is a precondition. If that is not there… If students are not convinced that making mistakes is okay, that they are there to engage in a learning process… Yeah, then you will not get those little gears in their mind spinning, so to say. That is why I think that is the most important. (Participant 1)*

Mutual care and commitment

Participants conveyed genuine care for their students' well-being and development. According to them, this involved understanding their students on an individual level – knowing about personal lives, interests, qualities, and areas for improvement. They also emphasized being a reliable support person during difficult times and striving to create personal learning opportunities that would facilitate their students' growth. In turn, they said students reciprocated by adopting a caring and constructive attitude toward their peers and the learning process.

> *I remember in the time of COVID, students were just withering away. They didn't like only being at home. And then I said, you know what, let's go together to the Amsterdam Forest and have a walk. They appreciated that greatly. I remember, and I really liked that, that they said: 'you know, you really take care of us'. […] And because I took care of them, they also cared for me. In*

> *the sense that, they know what I want. And if they feel that I take care of them they will take care of me by, well, doing their best. (Participant 3)*

Clear and shared classroom structure
Participants stated that student engagement required the teachers and the students to negotiate agreements and share responsibility in complying with them. When everyone knew what was expected of them, student engagement improved, and the efficiency and effectiveness of the active learning process increased.

> *I aim to establish a sort of democratic decision-making process. The choices that are made, the direction we take with the assignments - whatever we do - it should be shared and supported by everyone. This is essential. The idea is that they all endorse what we are doing. They should have the idea: 'we are here for ourselves and not because it's required for the course'. (Participant 8)*

2) Employing a personal educational approach

Teachers' educational values and competencies
Participants indicated that their approach to engaging students was shaped by their educational values and competencies. These values (beliefs and guiding principles) included student-centered learning, collaboration, responsibility, personal development, and lifelong learning. Each value informed their daily teaching practices in specific ways. For example, one teacher talking about the value of responsibility:

> *It is important to me that students do not just sit back and wait for the curriculum to hand them knowledge. No, they need to develop the competencies required to become a doctor. [...] They need to take responsibility for their development and regularly assess their progress. [...] That is why I communicate to them about their responsibility. Sometimes, I need to sit on my hands and resist the urge to help them, because of course I want to help them and just tell them what to do. But for their development, that is not the most effective approach. So, I literally tell myself: it was a good session when I did not have to do anything. (Participant 1)*

To effectively guide an active learning process that aligns with their educational values, participants acknowledged the need for advanced competencies. They reported developing these competencies over the years through various faculty development initiatives, conducting 'experiments' with their study groups, and through their general experiences as teachers. These activities, in turn, developed their sense of self-efficacy and autonomy, which resulted in being comfortable with their approach to the course in accordance with their values and competencies.

Knowledge and beliefs about students
Participants described an awareness of students entering their study groups with specific learning experiences and expectations, as well as personal qualities and needs. As

participants learned about these qualities and needs, they could use that information to personalize the active learning process and stimulate engagement at the same time.

> *[when starting a learning activity] I do not demand students to speak in a certain order or give them turns. I try very much to steer on what I know of a student: 'so you told me you would like to try a certain role. Take on that role today and contribute from there'. So if they are a bit reserved or a bit hesitant, they can take on that other role and ask questions. I challenge them to do that, because the study group would benefit from it. (Participant 11)*

Participants explained that the more they knew about their students, the more effectively they could stimulate engagement. Participants gained insight into the engagement requirements of their students, as well as cues indicating their disengagement, including students' expressions and reactions. This enabled them to implement strategies to re-engage students in such situations.

Course design elements

Participants reported knowing the course design very well. They knew the objectives, assignments, roles, methods, activities, and assessment. Although some parts of the course design were non-negotiable boundaries, participants took the initiative to choose and adapt their approach wherever possible, to optimally stimulate student engagement. Participants often mentioned that in the first sessions with a new study group, not enough time was dedicated to getting to know the students. They used their experience to make changes to the given schedule and assignments and created time for what they found important.

> *As a teacher you should be able to think beyond the rules and the specifics of one assignment and reflect on the purpose of the sessions and the course itself. The purpose is not to brainstorm a certain number of cases in a given time, or to follow a certain method to the letter. [...] The purpose is that students learn to think in a certain way, and you should focus on that. (Participant 2)*

3) Facilitating the active learning process

Observing

Participants commented on the importance of observing the students to regulate their engagement. They described observing as the active perception of what is happening in the moment. It involved recognizing and understanding subtle signals and behaviors. The teachers said they always did something, because at the very least they were observing.

> *I am always observing. In the beginning I aim to understand the dynamics of the groups and the roles of each of the students. Just to get to know them [...] To understand what kind of a group they are and how they collaborate. I am looking for indications of how the learning process unfolds and if they are making progress. [...] I look for who is contributing and who is not. (Participant 8)*

Observing was described as a complex competency: during study group sessions, multiple things would usually occur simultaneously and quickly. Participants noted that their students' engagement declined when they were distracted by something that reduced their ability to observe. For example, when participants were overly involved with the content, they would miss the nonverbal cues of students or fail to notice private conversations among them. They would then miss the opportunity to intervene.

Analyzing

Participants described analyzing as the step in facilitating the active learning process in which they made assessments or interpretations of their observations: does what they observe deviate from their expectations? If so, what could it mean? Participants described how this step was important before making a decision, because they could think about their observation from different perspectives, for example, their aim (what might this observation mean in light of the psychological safety I hope to provide?) or approach (what do I know about this student, and how might that affect their behavior?). After this consideration, participants would realize that there were a number of options they could choose from, with different outcomes.

> *So my idea is that at least you become aware of options A, B, and C. [...] And if you feel doubt about what to do, then you can dive into that doubt. Trying to feel what that doubt is, right? And then, well, then you have a bit more clarity regarding which choice you want to make, and why. So then you can justify it better for yourself. (Participant 3)*

Deciding

Participants described deciding on a course of action as the final step in facilitating the active learning process, after which a new process began with observing the effects of their actions. Reflecting on their development, participants noted that they used to frequently experience tensions between various possible courses of action, complicating their decision-making process. One participant explained how she dealt with the tension between 'doing the assignments and complying with the course manual' and 'creating personal opportunities for student development' by adhering to her educational value of 'personal development':

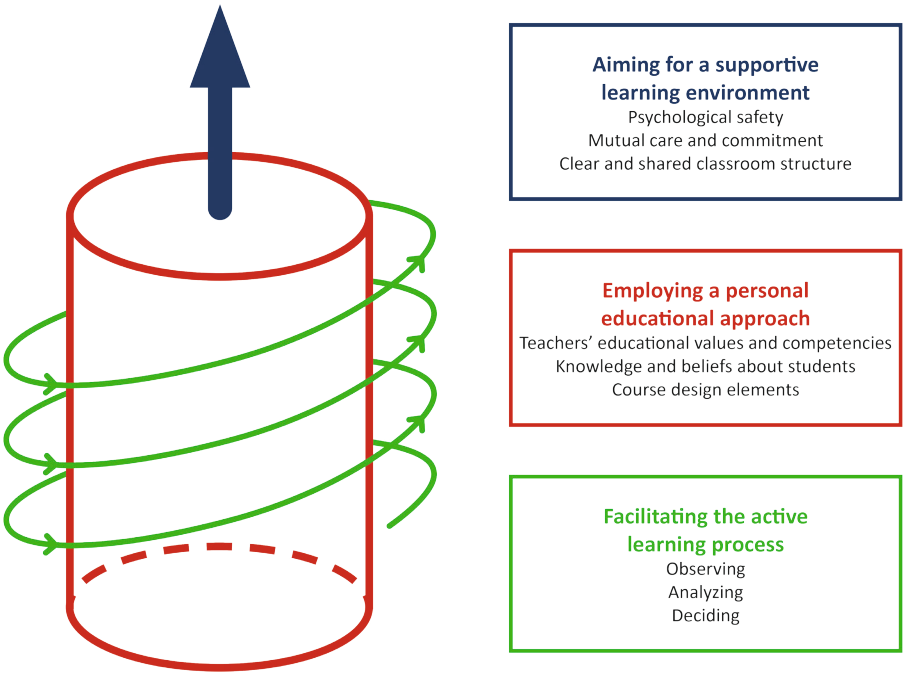
> *You have that tension. But only when you forget that they are human beings, and they are in a process of developing themselves. And that they all have something different to learn from the study group sessions, not necessarily only the course's learning objectives. [...] Of course, the course learning objectives, they need to learn those for their exams. But the study group sessions are also about gaining confidence and daring to speak in front of an audience, daring to voice your opinion, realizing the effects of always being late on fellow students and receiving comments about that behavior. I believe those experiences develop them as human beings. (Participant 2)*

DISCUSSION

In this study, we examined how expert teachers stimulated high levels of student engagement in small-group active learning. The theory we have constructed emphasizes three aspects. First, there was consensus among expert teachers on the importance of a supportive learning environment and the ability to facilitate an active learning process. Second, the expert teachers in this study described how they had developed and employed a personal educational approach, recognizing the contextual nature of student engagement. Third, student engagement was viewed as an integrated process consisting of all elements of the constructed theory. High levels of student engagement required extensive competencies in all the identified elements. Besides stimulating high levels of student engagement, participants reported that their competencies and practices prevented truly disruptive student behaviors in class. Figure 5.1 visualizes how the three components of the theory jointly stimulated student engagement.

Our findings contribute to the discussion about the paradox between the effectiveness of faculty development initiatives and the continuous challenge of student engagement in medical education (15,21,27,28). First, the theory we constructed identified which knowledge, skills, and attitudes were essential for the expert teachers. Currently, faculty development in medical education is commonly short in duration (e.g., single workshops) and limited in scope (e.g., interactive techniques like questioning) (25,27). Acknowledging these limitations, it is apparent that while faculty development initiatives do enhance teacher competencies in student engagement, they may not fully encompass all the essential aspects of success as reported by the participants in this study. This observation is not to diminish the value of these initiatives, but to underscore the need for a more comprehensive approach that integrates all reported aspects. Second, building on the previous point, our findings indicate that student engagement is context-dependent, as shown by the three aspects of 'personal educational approach.' All participating expert teachers agreed that there is no one-size-fits-all method to engaging students. Although they reported that they had learned general strategies for stimulating student engagement through faculty development initiatives, the expert teachers had to figure out which to use and how to make them work. Consequently, teachers enrolled in faculty development initiatives could, and that is what the expert teachers in this study did, consider the question 'which approach might be effective in this context, taking into account my own set of values and competencies, the characteristics of my students, and the specifics of the course I am involved in?' Moreover, through the process of observing, analyzing, and deciding on a course of action, the expert teachers remained reflective on the impact of their approach and could adapt if needed. In conclusion, while faculty development serves as a cornerstone for developing teachers' competencies in stimulating student engagement, our research highlights the importance of a comprehensive and contextualized approach to ensure a positive impact on actual teaching practices.

Figure 5.1. Grounded theory of how expert teachers stimulate high levels of student engagement



The blue arrow illustrates how expert teachers cultivate an increasingly supportive learning environment through their personal educational approach. As this process unfolds, they observe their students, analyze cues related to their aims and approach, and decide on a course of action.

Limitations and strengths

Although this study provides useful insights for faculty development, there are several issues to consider when interpreting the results. The selected expert teachers were medical teachers from one Dutch university in a course employing a case-based (years 1 and 2) and team-based (year 3) learning approach. Thus, the sample selection, geographic context, and teaching method may have influenced our findings. Additionally, the teachers' educational values in this study aligned well with active learning. Future research could explore whether such an alignment is a key factor for successful active learning implementation. Lastly, we based our grounded theory on teacher interviews and used a limited 'theoretical sampling' procedure. An extended theoretical sampling procedure in which other methods (like classroom observations or student interviews) are integrated could further advance our understanding.

A main strength of this study lies in the application of appreciative inquiry. This method has been identified as an 'exciting potential' for medical education research due to its focus on 'what is going well' and its generative process (36). We experienced the interviews to be characterized by high positive energy and rich information. Participants spoke openly

about their experiences and beliefs and often indicated feeling inspired and having learned something about themselves.

Finally, we want to consider the inclusion of teachers with varying levels of expertise in this study. Although all participants met our inclusion criteria, some had more experience or qualifications than others. While this could be seen as a limitation, as it may influence the findings of our study, we argue that it was a strength. For example, during the interviews, all participants expressed that they value psychological safety. However, some were hesitant in describing how they achieved it, while others had developed comprehensive approaches they could articulate. This variation reinforces firstly the importance of psychological safety, and secondly the implication for faculty development for a comprehensive and contextualized approach, allowing teachers of varying levels of expertise to develop their competencies in engaging students.

CONCLUSIONS

In conclusion, this study explored how expert teachers engaged their students in small-group active learning sessions. Our constructed theory described student engagement as an integrated process consisting of three components, which demanded extensive competencies from teachers in each component: 1) aiming for a supportive learning environment; 2) employing a personal educational approach; and 3) facilitating the active learning process. Although there was consensus about the required competencies, participants recognized the contextualized nature of student engagement. These findings highlight the need for faculty development initiatives, which aim to prepare medical teachers to teach in small-group active learning settings, to adopt a more encompassing, context-sensitive approach that considers the complexity of student engagement. Furthermore, the findings could encourage teachers to adopt a reflective mindset that enables them to adapt general strategies to strategies tailored to them in their context.

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Appendix 5.1. List of questions to guide the interview

Structure of interview	Example questions
Discover question (Goal: focus on positive teaching experience and collaboratively discovering what underlying processes might have contributed to that experience)	Can you tell me a story about a recent study group meeting where everyone was active and engaged with each other and with a study assignment? So really a positive experience. This can be a moment, or a group, or a specific study assignment that you were impressed with or proud of. Example follow-up questions: - In that situation, what was your role? What did you do, what did you think, and what did you feel? - What is it about this story that makes it such a positive experience for you? - What do you think is necessary for such a wonderful thing to happen? - What can we learn from this story, in your opinion?
Contrasting question (Goal: gain more insight into underlying processes by exploring student engagement from an opposing perspective)	With the same study group as the first story, or maybe another group, does it sometimes not work out? Example follow-up questions: - Can you tell me more about that, just like with the positive teaching experience just now, or describe what it was like? - In that situation, what did you do, what did you think, and what did you feel? - What is it about this story that makes it difficult for you? - And as before, what do you think contributed to this happening? - What have you learned from this situation?
Broadening question (Goal: gain more insight into underlying processes by exploring a different story)	Can you share another such positive experience with a study group that might have been very different from the story you just told? Example follow-up questions: - What makes this experience also positive for you but still different? - Again, what was your role? What did you do, what did you think, and what did you feel? - What do you think was necessary for this wonderful thing to have happened? Are they the same things you just mentioned, or was there something else at play? - What can we learn from this story, in your opinion? Is it a confirmation of the above, or is there something else?

Structure of interview	Example questions
Dream question (Goal: reflecting if and how the tutor training supported first time tutors)	If I ask you to dream about active learning and students engaging in the learning process... - What are your dreams? What do they look like? Can you describe that? Example follow-up questions: - Imagine we are living in the future, so two years from now, for example, and your dreams have come true! And indeed it is the case that... (mention dreams) i. What has changed in the next two years that has made this possible? (in course design, teachers, students, ...) ii. How has this change been able to happen – who has done what? iii. What has changed about you in those two years? Have you developed something? iv. What makes that aspect so important that you are paying attention to it?
Closing questions (Goal: collaboratively reflect on the interview and distill key points)	Example question: -What do you think have been key points in this interview? - Which aspects of everything we discussed do you think are essential for the engagement of the students in your study groups? - What would you like to pass on to beginning tutors if they want to learn how to engage their students? - Do you have anything to add to what we have discussed and what may be important for this research? - What have you yourself learned from this interview?

CHAPTER 6

Preparing medical teachers for small-group active learning: a design-based research study focusing on transfer

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ABSTRACT

Purpose

Although Faculty Development Initiatives (FDIs) typically enhance teachers' proficiency in active learning strategies, the transfer of knowledge and skills from FDIs to actual teaching practice often poses challenges. We designed, implemented, and evaluated an FDI aimed at stimulating transfer.

Materials and methods

We conducted a Design-Based Research study with 34 new medical teachers in a small-group active learning course. The FDI we designed employed Self-Directed Learning and integrated on-the-job and off-the-job learning. To evaluate how the FDI stimulated transfer, we used surveys, observations, and interviews, conducted in two separate iterations. We applied a combination of inductive and deductive analysis methods.

Results

The FDI stimulated transfer in three ways, according to the participants: 1) Autonomy in creating personal learning objectives and learning process increased motivation to transfer, 2) Peer, supervisor and student support encouraged adoption of new teaching strategies, 3) Integrating on-the-job experiences and off-the-job meetings promoted a continuous learning cycle of experiencing, reflecting, understanding, and applying.

Conclusion

Integrating Self-Directed Learning with on-the-job and off-the-job learning within the FDI can stimulate the transfer of knowledge and skills to participants' teaching practice. This strategy may be particularly suitable for facilitating small-group active learning, a challenging competency that requires comprehensive assistance from FDIs for successful implementation.

INTRODUCTION

Faculty Development Initiatives (FDIs) in medical education typically emphasize the importance of active learning, since student engagement in various active learning methods has been shown to play a crucial role in medical student development (1–6). Reviews of FDIs generally support their effectiveness in enhancing medical teachers' proficiency in active learning strategies (7–9). However, medical teachers often face barriers in consistently applying the knowledge and skills they have acquired about active learning in their teaching practice. These barriers include: a) student factors, such as lack of preparation or reluctance to engage, b) teacher factors, such as limited preparation time or concerns about content coverage, c) pedagogical issues, such as inadequate classroom design or large class sizes, and d) institutional restrictions, such as insufficient support or recognition for teachers who use active learning (10–13). These barriers can decrease teachers' motivation to develop their competencies in facilitating active learning and limit the required changes that they need to make to their teaching practices to implement active learning properly. This may lead to inadequate implementation of active learning, which has been shown to limit medical student development, as students tend to disengage from learning in such situations (14–16).

The process by which participants apply lessons from FDIs in their own teaching practice is called 'transfer'. Transfer has been defined as 'the effective (generalization) and continuing (maintenance) application in the job environment of the skills, knowledge and conceptions gained in a staff development context' (17). Successful transfer contributes to medical faculty wellbeing and development, improved behaviors, organizational change, student learning, and even patient outcomes (7–9). Transfer, however, is a complex process influenced by numerous interacting variables. This often leads to participants failing to apply their newly acquired knowledge and skills in their teaching practice (17,18). In addition, FDIs are typically limited in time and scope due to constraints such as high job demands, lack of organizational support, and financial restrictions, making it difficult to incorporate strategies that enhance transfer (7,8,19). Another contributing factor to the transfer problem is that FDIs are often conducted away from the workplace. This creates a gap between the learning and application settings, which makes it less likely for FDI participants to remember and use what they have learned (9,17,18,20). Thus, it is important to design FDI in such a way that the transfer of knowledge and skills from FDI to teaching practice is stimulated.

Two potential solutions to overcome these limitations in FDI design and to reduce the gap between learning and application settings are Self-Directed Learning (SDL) and combining off-the-job and on-the-job learning (7,9,17–19).

SDL has been defined by major proponent Malcolm Knowles as "a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources

for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (21). SDL encourages FDI participants to reflect on what they want to learn and how to achieve that. This process prompts participants to devise a plan that aligns with their job context and to proactively identify solutions to barriers (22). Thus, by guiding FDI participants to become self-directed learners, transfer can be stimulated (17,18).

Off-the-job learning is when FDIs take place away from the workplace and includes structured training, workshops, and other educational courses not directly tied to employee's daily work tasks. On-the-job learning refers to the learning that occurs when employees engage in their work and includes peer and supervisory support, coaching, organizational learning climates, and other work-related factors (17,18). While off-the-job learning can help to minimize distractions, be facilitated by expert faculty developers, and take place in controlled locations, on-the-job learning allows FDI participants to acquire experience in the real world (23). Combining these approaches allows for a more comprehensive learning in which the acquisition and application of knowledge and skills are integrated, thus contributing to transfer.

Aim, objective, and research question

The aim of this study was to enhance medical teachers' competencies in facilitating small-group active learning methods, so that student development may be improved. Our objective was to design and evaluate an FDI that specifically focused on stimulating transfer, enabling teachers to apply the lessons learned in their own teaching practices.

Our main research question for this study was: How does a Faculty Development Initiative that combines self-directed learning with off-the-job and on-the-job learning stimulate the transfer of medical teachers' competencies in facilitating small-group active learning to their teaching practice?

METHODS

Research design and procedure

Design-based research

Design-Based Research (DBR) aligned well with our aim. DBR aims to systematically design and implement educational interventions, while simultaneously advance theoretical understanding (24–28). DBR studies can be characterized by: 1) the use of an iterative process of design, evaluation, and redesign; 2) being conducted in authentic real-life learning settings; 3) its dual aim of solving educational challenges and advancing theory; 4) mixed-method evaluation practices; 5) a collaborative approach of designers, researchers, and practitioners with different expertise (26,29,30).

We adopted a pragmatic stance to data collection and analysis, recognizing that knowledge and action are closely connected in DBR (31,32). Moreover, the pragmatic paradigm matched well with a mixed-methods research design (33).

Development of a prototype FDI
As DBR is oriented towards finding sustainable solutions to educational challenges, we set out to develop a prototype that was feasible, sound, locally viable, easy to institutionalize, potentially effective and positively impacted teacher competencies (27). Therefore, for the analysis and design stage of this project, we included faculty developers, course coordinators, educational researchers, study program directors, teachers and students as stakeholders (34).

In DBR, design principles aim to bridge the gap between theory and practice by offering practical guidelines for the design of a prototype (24,27,34). In alignment with our research question and aim, our most important overarching design principles were Self-Directed Learning (SDL) and combining off-the-job and on-the-job learning. The prototype was discussed and refined through an iterative process involving all stakeholders (27,34).

The final prototype incorporated a mix of various off-the-job and on-the-job learning opportunities, each featuring activities that encouraged self-directed learning among participants. The sequence of the prototype was as follows: a course day before the start of the semester, a mutual observation task after three weeks, a guided peer coaching meeting after six weeks, and monthly tutor meetings. In addition, individual coaching was available for participants as needed, and participants were encouraged to continue their learning during their teaching. A detailed overview of the final prototype can be found in Appendix 6.1.

Participants and setting
The 34 participants in this study had recently started as teachers of a tutoring course in the Bachelor's phase of medical training at the Medical Faculty of the Vrije Universiteit Amsterdam. They represented a mix of various medical and research backgrounds, with some having had limited teaching experience. Participants did this teaching task alongside their main appointment as clinician or researcher.

The tutoring course was designed as a small-group active learning course. The teachers in the tutoring course were tasked with facilitating the active learning processes that students were supposed to engage in during the course. Each teacher had their own study group consisting of maximum twelve students, which they saw twice per week. The course was designed as a collaborative case-based learning experience with patient cases and assignments. During the first meeting of each week, students brainstormed the cases and assignments, while at the second meeting, they presented the findings. Meetings were student-led and learning the content was the responsibility of students, which gave teachers in this course the opportunity to focus their attention on student participation and group dynamics.

Instruments

To comprehensively understand the effects of the prototype, we employed a combination of measures in a concurrent mixed-methods approach (33). Quantitative data were collected through surveys we developed for this study, following the course day and guided peer coaching to evaluate their: 1) experience of Self-Directed Learning as a way to stimulate their development (6 items); 2) improvement in active learning competencies (5 items); and 3) motivation to transfer (2 items). In this survey, we included items to measure 'motivation to transfer', an important precursor for actual transfer, as there were limited opportunities for transfer to have occurred (18).

Qualitative data were collected through semi-structured interviews at the end of the semester by JWG or RG to explore how the design principles stimulated transfer and how the FDI achieved its effectiveness in developing participants' active learning competencies. The interview guide can be found in Appendix 6.2. Finally, JWG attended each course day, guided peer coaching meeting, and several tutor meetings for observation purposes. The observations were used as prompts in interviews for deeper investigation of topics.

To evaluate and improve the prototype, we decided to run two iterations, after which we felt that we had optimized the design, acquired understanding of the transfer process, and the effectiveness of the FDI. The first iteration started in August 2022 with fifteen participants. The second iteration started in February 2023 with nineteen participants. We collected data in the same way in the two iterations.

Data analyses

The quantitative data for both iterations were analyzed via descriptive statistics in IBM SPSS statistics (version 28). The qualitative data in the first iteration were analysed using inductive thematic analysis, following Kiger and Varpio's six-step procedure (35), and using the design principles as sensitizing concepts. Resulting themes were used as a coding framework for qualitative data analyses in the second iteration. We then used Directed Content Analysis to corroborate the findings of the first iteration, while remaining open for new information (36).

Following our pragmatic stance, all data were combined to answer the research question. Insights from each data source were assessed, compared to each other, and evaluated for their contribution to our understanding. Inconsistencies were discussed and resolved in the author team.

Reflexivity

We had extensive expertise in active learning, faculty development, educational design, educational research, and design-based research. Two authors had practical experience with the tutoring course: one was an experienced teacher of the course, while another was a medical student who had completed three years of the tutoring course. We valued the

different perspectives that the researchers brought to the study, while remaining aware that this may have influenced the design and evaluation of the prototype. Therefore, we attempted to remain reflexive throughout the research process and acknowledge our own subjectivity.

Ethical aspects

Ethical approval was obtained from the Ethical Review Board of the Netherlands Association for Medical Education (NVMO-ERB dossier number 2022.5.4).

RESULTS

The evaluation of the two iterations is described together here, to present the findings coherently and concisely.

Table 6.1 presents the participant survey data for both iterations. The items on SDL were scored between 4.00 and 5.00 on a five-point scale, indicating that participants agreed that SDL was a good way to stimulate their development. Participants scored lower on the item regarding having a better understanding of personal strengths and areas for development (iteration 1: M = 3.87, SD = 0.92; iteration 2: M = 3.74, SD = 0.99). The items that measured participants' improvement in facilitating active learning were all scored between 4.00 and 5.00. There was an increase in active learning facilitation competencies before and after the course day and guided peer coaching meeting in both iterations. Motivation to transfer was high, as participants scored items between 4.00 and 5.00.

The interview data (N = 28) uncovered how, according to participants, Self-Directed Learning and the integration of on-the-job and off-the-job learning stimulated transfer. Three themes were identified: 1) Autonomy in creating personal learning objectives and learning process increased motivation to transfer, 2) Peer, supervisor and student support encouraged adoption of new teaching strategies, 3) Integrating on-the-job experiences and off-the-job meetings promoted a continuous learning cycle of experiencing, reflecting, understanding, and applying.

Table 6.1. Summary of participant survey data (N = 34)

	Iteration 1 Mean (SD)	**Iteration 2 Mean (SD)**
Course day	(N = 15)	(N = 19)
Self-Directed Learning		
I have a better understanding of my strengths and areas for development in teaching a small-group active learning class	3.87 (0.92)	3.74 (0.99)
I think setting a personal learning objective is a good way to stimulate my development	4.47 (0.64)	4.47 (0.61)
I have a plan for achieving my personal learning objective	4.27 (0.88)	4.26 (0.81)
I know how to deal with obstacles should they arise	4.40 (0.51)	4.68 (0.58)
Motivation to transfer		
I feel motivated to use the knowledge and skills I learned during the course day	4.47 (0.64)	4.58 (0.51)
I know how to apply the knowledge and skills I learned during the course day	4.40 (0.63)	4.32 (0.67)
Competencies in facilitating active learning		
I am aware of challenges related to teaching a small-group active learning class	4.33 (0.72)	4.63 (0.50)
I know how to deal with challenges related to teaching a small-group active learning class	4.20 (0.56)	4.32 (0.48)
I am aware of best-practices related to teaching a small-group active learning class	4.27 (0.59)	4.37 (0.76)
I know how to implement best-practices related to teaching a small-group active learning class	4.20 (0.68)	4.26 (0.81)
I feel competent in facilitating the active learning processes of students (before and after course day)	3.27 (0.70) – 4.40 (0.51)	2.79 (0.71) – 4.00 (0.33)
Guided Peer coaching	(N = 8)	(N = 12)
Self-directed Learning		
I intend to keep on working on my personal learning objective	4.75 (0.46)	4.83 (0.39)
I know how I will keep working on my personal learning objective	4.50 (0.53)	4.67 (0.49)
Motivation to transfer		
I feel motivated to use the knowledge and skills I learned during peer coaching	4.50 (0.53)	4.83 (0.39)

Table 6.1. Summary of participant survey data (N = 34) (continued)

	Iteration 1 Mean (SD)	Iteration 2 Mean (SD)
I know how to apply the knowledge and skills I learned during peer coaching	4.63 (0.52)	4.50 (0.52)
Competencies in facilitating active learning		
I am aware of challenges related to teaching a small-group active learning class	4.75 (0.46)	4.83 (0.39)
I know how to deal with challenges related to teaching a small-group active learning class	4.25 (0.46)	4.50 (0.52)
I am aware of best-practices related to teaching a small-group active learning class	4.38 (0.52)	4.33 (0.89)
I know how to implement best-practice related to teaching a small-group active learning class	4.38 (0.52)	4.25 (0.87)
I feel competent in facilitating the active learning processes of students (before and after guided peer coaching)	3.88 (0.64) – 4.13 (0.35)	3.58 (0.51) – 4.25 (0.62)

Note. Answers could be given on a scale from 1 to 5. 1 = completely disagree and 5 = completely agree. Differences in N between course day and guided peer coaching were mainly due to scheduling conflicts.

1) Autonomy in personal learning objectives and learning process enhanced motivation

Participants reported that they felt motivated by the autonomy they were given to formulate a Personal Learning Objective and a plan of approach at the end of the course day. This enabled them to develop skills that were personally relevant and to feel a sense of commitment to grow in that aspect. It also allowed them to create a plan of approach that suited them and their work context, and to change that plan if something in their context changed. Additionally, it helped them to create focus, since during the course day and through the preparatory reading, they received a lot of information. During their teaching, they actively sought opportunities to learn and reflect on their Personal Learning Objective.

> *Interviewer: What was your Personal Learning Objective?*
> *Participant: That was to create a safe group. […] I had set that objective because I thought that was really the most important thing. That they feel safe with each other, that they can say anything.*
> *Interviewer: So you setting that objective, how did it influence you in starting and facilitating the study group?*
> *Participant: I think I was much more personal, and I also reflected on how the group was doing in this regard. How is it right now? Should we do something for it? And I also very proactively asked them, for example, during a formative assessment meeting: "Is this a good group for you?"*

> *And if not, what would they want differently or where and when it would be a good group for them. (Iteration 1, Participant 9)*

During follow-up meetings, participants would share insights related to their Personal Learning Objectives, but also questions and obstacles. The conversations that occurred at those meetings further supported participants' motivation, as they felt inspired and supported by other participants.

2) Support from peers, supervisor, and students stimulated adoption of new teaching strategies

Facilitating small-group active learning was reported to be a challenging skill, even for participants who had received prior training. Applying the knowledge and skills of the FDI to their teaching practice required them to manage feelings of uncertainty and potential failure. For this reason, participants required support. They reported seeking support through coaching from their supervisor and through asking questions to fellow teachers in their department. During FDI meetings, they sought the support of peers and supervisors by discussing experiences, asking questions, and sharing insecurities.

> *Participant: I found the peer coaching very useful, where we really discussed cases. And that is exactly what you need. You can't prepare yourself that well for teaching because things will go a certain way. And during the peer coaching, you can discuss things very concretely. For instance, the case we had about certain student behaviors. And how you can handle that. And I think that was the most useful for me personally. To see what other teachers are running into and that it is 'not strange' [what I am running into and what I have difficulty with]. (Iteration 1, Participant 2)*

Finally, participants who had opened up to their students about being a first-time teacher, and communicated their intentions and openness to feedback and learning, reported receiving valuable information about how they facilitated the active learning process. They reported that they felt supported by their students through constructive comments they received about instances that could have been handled better and compliments about things that were going well. This further enhanced their sense of learning and self-efficacy.

3) Integrating on-the-job experiences and off-the-job meetings promoted a continuous learning cycle of experiencing, reflecting, understanding, and applying

According to the participants, there was a synergy between on-the-job experiences and regular off-the-job meetings throughout the semester, as each inspired the other. The on-the-job experiences were reflected upon during the meetings, so that on the one hand learning from those experiences was stimulated, and on the other hand guidelines were created for future teaching practice. Applying those guidelines led to new experiences, in effect creating a dynamic learning cycle where theory and practice were interwoven.

> *Participant: I think it was the frequent meetings [that supported participants' development]: the peer coaching and the tutor meetings. There I could discuss my experiences, what I ran into and what went well. That gave me confidence: I am not the only one running into this.*
> *Interviewer: and how did those meetings support your development?*
> *The training was for first-time tutors. It [the FDI] should guide someone on how to start. Ensure they have enough tools so that they can at least start their study groups and guide the students. […] I think that the initial course day ensured that we could actually get started. And between the meetings, it [the FDI] ensured that I remained sharp on where I am working on now and how I can proceed. You need to continue developing your skills, because you can't just say: you've had training, here is your tutor certificate, you can now facilitate study groups perfectly from now on. It does not work like that, so there needs to be something. I think this [the FDI] had a pretty good balance, although there is time involved in all those moments of returning and peer coaching session and the like. Especially when we, for instance, also have other work to do. I think it is a good balance. You have a few study group meetings, brainstorm sessions, and presentations, and then you get together again [with peers and supervisor] to discuss how this period went. It actually worked quite well this way. (Iteration 2, Participant 15)*

The participants appreciated this approach, as it enriched their learning experiences and promoted a culture of continuous improvement and adaptation in their teaching practices.

DISCUSSION

In this study, we designed, implemented and evaluated an FDI aimed at enhancing medical teachers' competencies in facilitating small-group active learning. We focused specifically on stimulating transfer of knowledge and skills through combining SDL with off-the-job and on-the-job learning. This study resulted in two main findings. First, participants reported that the FDI enhanced their competencies in facilitating small-group active learning, motivated them to transfer what they learned to their teaching practices, and confirmed SDL as a suitable method for their development. Second, according to the participants, the combination of SDL with off-the-job and on-the-job learning stimulated transfer through: 1) providing autonomy in personal learning objectives and learning process, 2) peer, supervisor and student support, and 3) engaging them in a cycle of experiencing, reflecting, understanding, and applying.

This study contributes to the FDI literature by demonstrating the value of designing FDIs that combine SDL with off-the-job and on-the-job learning experiences. SDL can strengthen teachers' autonomy and flexibility to pursue personally relevant knowledge and skills, while the combination of off-the-job and on-the-job learning can provide teachers with essential knowledge and skills, significant work experiences, support, and feedback related to those pursuits (17,18). This design may provide a solution to previously identified constraints in time, finances, and organizational support (7,8,19), by offering potentially an efficient

approach. Although this study provides a solid claim for this statement, additional research would be needed to further justify it.

Another contribution to the FDI literature is that the combination of SDL, off-the-job, and on-the-job learning can alleviate some of the criticism of these concepts in isolation. SDL requires that learners be responsible for their own development, which can lead learners (and teachers) to think that they need to do it alone (21,37). In situations without proper guidance, SDL can be perceived by learners as a synonym for lack of support (38). On-the-job learning can provide peer and supervisor support through sharing on-the-job experiences, feedback, and coaching. However, on-the-job learning has been criticized for placing a high cognitive load on learners, especially on novices, resulting in less optimal learning (39). In situations with high cognitive load, the focus that SDL can bring might enhance learning by reducing the experienced load. Off-the-job learning takes place away from the workplace, in a focused, structured, and facilitated setting, thereby again reducing load. However, since off-the-job learning has been shown to create a gap between learning and application settings (17,18), it can benefit from the real-world experiences that on-the-job learning can deliver. Thus, the combination of the three concepts can stimulate transfer by providing a supportive, focused, and authentic learning experience.

Limitations and strengths

Like most DBR studies, the present study was not a (quasi) experiment. We therefore could not test hypotheses, compare groups, or quantitatively measure the effect of the FDI. Furthermore, we relied heavily on self-reported data and we had a relatively low number of participants. However, the use of DBR allowed us to study the impact of the FDI in a natural setting, with a diverse team, guided by theory, and using an iterative and mixed-methods approach. We conclude that the design was feasible, effective, and responsive to the needs of the participants, so that participants felt supported, prepared, and guided in their new tasks as facilitators of students' active learning process.

Future research

Our results provide a foundation for future research on teaching medical teachers to implement active learning. Two main recommendations are: 1) Explore student feedback as an FDI component besides peer and supervisory support, as participants acquired valuable insights from students about their newly adopted strategies; 2) Explore just-in-time learning strategies for FDI design, as participants noted that lessons could not always be applied immediately, reducing their ability to transfer.

CONCLUSION

The integration of Self-Directed Learning with on-the-job and off-the-job learning can stimulate the transfer from FDI to educational practice. This strategy may be particularly

suitable in the context of facilitating small-group active learning, a challenging competency that requires comprehensive attention from FDIs for successful implementation.

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Appendix 6.1. Overview of the final prototype

Course day *(off-the-job)*	**Observation** *(on-the-job)*	**Guided peer coaching** *(off-the-job)*	**Tutor meetings** *(both on-the-job and off-the-job)*	**Individual coaching** *(on-the-job)*	**Learning when teaching** *(on-the-job)*
Organized the week before the start of the semester. Preparing for this day included reading course materials, watching knowledge clips, and reading an article on facilitating active learning which included a self-assessment tool on essential facilitator skills. *(SDL 1)* Day led by supervisor and faculty developer. During the day participants would gain competencies needed to facilitate an active learning process through discussing information, engaging in various learning activities including feedback, and reflecting on their personal qualities and areas for improvement. *(SDL 1. OOJL 2 and 3)* At the end of the day, participants would formulate a Personal Learning Objective (PLO), discuss it with peers and facilitators and develop a plan of approach including a plan for evaluation. *(SDL 2, 3, 4 and 5)*	Three weeks after the start of the semester, participants were paired to observe each other in vivo, give each other feedback, and discuss other topics related to their PLO and other teaching experiences *(SDL 4. OOJL 1)*	Organized six weeks after the course day. Meeting led by supervisor and faculty developer. During the meeting participants engaged in peer coaching to discuss workplace experiences, questions, and personal insecurities. Participants also discussed progress in their PLO *(SDL 4 and 5. OOJL 1, 2, and 3)*	Organized each month, between the end of a theme and the start of a new one. Meeting led by supervisor. During the meeting all current teachers of the course (new and experienced) collaboratively reflected on the last theme and prepared for the upcoming theme. In subgroups, participants also discussed workplace experiences, and PLO related questions *(SDL 4 and 5. OOJL 1, 2, 3)*	Participants could receive coaching from the supervisor on issues related to active learning as they arose during the semester. *(OOJL 4)*	During meetings, participants were stimulated to formulate intentions and strategies, to try out and learn from different approaches to stimulate the active learning processes of their students. *(OOJL 3)*

Note. Explanation of information between brackets. SDL = Self-Directed Learning (*1 = diagnosing learning needs, 2 = formulating learning objectives, identifying human and material resources, choosing and implementing learning strategies, evaluating learning outcomes).* OOJ = On- and Off the Job Learning (*1 = peer support, 2 = supervisory support, 3 = transfer climate, 4 = coaching).*

Appendix 6.2. List of questions to guide the interviews

Structure of interview	Example questions
1. Opening questions (Goals: getting comfortable; activating relevant experiences and information)	- How was your first semester as a teacher? - What were some things that you liked / did not like / that surprised you (either in a good or bad way)?
2. General FDI questions (Goal: reflecting whether and how the FDI supported participants)	- Which parts of the training did you participate in? How did (or did not) each part contribute to your competencies in guiding the active learning processes of your students? - Overall, how well do you think you were prepared and guided in learning to facilitate the active learning process of students? - To what extent have you used the knowledge and skills you learned in the training in your own study groups? What impact do you think that made on the study group?
3. Design Principle questions (Goal: reflecting if and how the design principles supported participants)	- One aim of the training was to stimulate you to take control of your own learning process and develop yourself on something relevant to you throughout the semester. How did this work out for you? What did you think about having a Personal Learning Objective? How do you think it influenced your development as a teacher this last semester? - Another aim of the training was to stimulate you to learn from your workplace experiences. For that reason we had the regular meetings throughout the semester. You could gain experiences in your teaching tasks and then meet with your peers in various meetings to discuss them. How did this work out for you? How do you think it influenced your development as a teacher this last semester?
4. Closing questions	- Did you seek advice for your teaching task outside the training? - How do you think the FDI could be optimized? What could be kept as it is and what could be changed, added or deleted?

CHAPTER 7

General discussion

In this thesis, we delved into the critical issue of student engagement in active learning within the context of medical education. Our central research question focused on supporting medical teachers in implementing small-group active learning into their teaching practices in such a way that student engagement was optimized. To this end, we conducted five empirical studies. The first four studies were designed to gain an in-depth understanding of student engagement, while the fifth study aimed to apply that knowledge. Our research took a comprehensive approach, utilizing a range of research designs and examining the subject from the perspectives of students, teachers, and faculty development. The overarching aim of this thesis was to improve the implementation of active learning in medical education.

This general discussion addresses the central research question by highlighting the main findings from the three perspectives: students, teachers, and faculty development. We will synthesize these findings and propose practical implications. Following this, we will assess the strengths and weaknesses of our research approach, concluding with suggestions for future research.

Main findings of this thesis

Overview

Table 7.1 presents an overview of the main findings of the five studies presented in the previous chapters. Subsequent paragraphs will provide an expanded explanation of the findings, focusing on their contribution to the central research question.

Table 7.1. Overview of the main findings of each study

Chapter	Research Question	Results
2	When and why do medical students appreciate small-group active learning?	• Four student profiles that describe shared viewpoints on learning from small-group active learning were identified: 1) Understanding-oriented, 2) Assessment-oriented, 3) Group-oriented, and 4) Practice-oriented. • Students reported to be more motivated and engaged when their experiences with the learning process aligned with their viewpoint.

Table 7.1. Overview of the main findings of each study (continued)

Chapter	Research Question	Results
3	How and why does student appreciation of small-group active learning change during the Bachelor program?	• Two new student profiles were identified: 1) Success-oriented and 2) Development-oriented, describing how student appreciation of small-group active learning changes. • Students reported that changes in their viewpoint could be attributed to personal growth, realization of the importance of interpersonal aspects of learning, experiences with different teachers, and curricular factors. Jointly, these factors translated into different expectations from the learning process.
4	1) How do the three dimensions of student engagement interrelate in a classroom setting? 2) How do antecedents of student engagement influence student engagement in class? 3) How can the multidimensional view of student engagement help us to understand why it can be difficult for teachers to engage their students?	• In-class student engagement followed a spiral-like pattern. Once students engaged or disengaged on one dimension, other dimensions were likely to follow suit. • Students decided on their willingness to engage in class before the start of class, depending on their perception of several personal, social, and educational antecedents of engagement. • Distinguishing engagement from disengagement appeared to be difficult for teachers, because the intention behind student behavior was not always identifiable.
5	How do expert medical teachers stimulate high levels of student engagement in small-group active learning sessions?	• A grounded theory of expert teaching practice was constructed, describing student engagement as an integrated process consisting of three components: 1) Aiming for a supportive learning environment; 2) Employing a personal educational approach; and 3) Facilitating the active learning process.
6	How can a Faculty Development Initiative, aimed at enhancing medical teachers' competencies in facilitating small-group active learning, be designed so that transfer is stimulated?	• Teachers were trained in facilitating small-group active learning. • Autonomy in creating personal learning objectives and learning processes increased teachers' motivation to transfer. • Peer, supervisor, and student support encouraged teachers to adopt new teaching strategies. • Integrating on-the-job experiences and off-the-job meetings promoted a continuous learning cycle of experiencing, reflecting, understanding, and applying for teachers.

Students' perspectives on active learning

Students' perspectives on active learning was addressed in Chapters 2, 3, and 4. In Chapters 2 and 3, medical students' appreciation of small-group active learning was explored. In Chapter 4, we studied the process of in-class student engagement.

Chapter 2 reported on a Q-methodology study we conducted among first-year students to explore when and why students appreciated active learning as an element of their medical training (1). Fifty-two participants completed the Q-sorting procedure and answered questions to elaborate on their opinions, resulting in the identification of four student profiles. Each profile represented a shared viewpoint of a subset of students, characterized by specific study motives and preferences for learning from small-group active learning. The four profiles were: 1) Understanding-oriented, 2) Assessment-oriented, 3) Group-oriented, and 4) Practice-oriented. Table 7.2 summarizes these profiles, delineating the perceptions of students within a profile regarding their roles and responsibilities, their study groups, their tutors, and their expectations of their medical school. Students in this study reported increased motivation and engagement when their educational experiences aligned with their viewpoint. This study offered insight into the challenge teachers face in engaging all students in a class: students' motives and preferences are varied and can be conflicting.

In Chapter 3, we invited the same participants of the Q-methodology study, three years after their original contribution, to participate in a study that repeated the study procedure of the previous study. The objective was to explore if, how, and why their appreciation of small-group active learning had changed (2). Twenty students participated in this second Q-methodology study, of which seven partook in an additional interview to reflect on the reasons for changes (or lack thereof) in their appreciation. We identified two additional student profiles: 1) Success-oriented and 2) Development-oriented. The summary of these profiles can be found on the right side of Table 7.2. The interviews revealed that changes in student appreciation of active learning could be attributed to personal growth, realization of the importance of interpersonal aspects of learning, experiences with different teachers, and curricular factors. These changes in appreciation of active learning translated into different expectations from the learning process (i.e., different expectations of themselves, their peers, teachers, and their medical program), necessitating a modified educational approach. This study illustrated the dynamic nature of student appreciation of active learning, indicating the value of regular discussions with students to understand their motivation and drivers for engagement to stimulate their engagement.

Table 7.2. Summary of the profiles identified in the two Q-methodology studies (2)

	Time 1 (2018)				Time 2 (2021)	
	Profile 1 Understanding-oriented	**Profile 2** Assessment-oriented	**Profile 3** Group-oriented	**Profile 4** Practice-oriented	**Profile 1** Success-oriented	**Profile 2** Development-oriented
Role of students	Develop a deep understanding of all aspects of medicine	Learn what has to be learned for the assessments	Contribute to good atmosphere in study group, and engage with peers on content	Prepare for future career in clinical practice	Do well on exams and in internships	Develop personal and clinically relevant knowledge, skills, and attitudes
Role of study group	Opportunity to learn from other students' perspectives	Ask questions and improve understanding of the content	Social network (friends), and social support system	Learn collaboration skills needed as a doctor	Learn clinical reasoning and interpersonal skills	Self-regulate their functioning
Role of tutor	Motivate students to engage with study material and challenge them to find their own answers	Explain the content as a subject matter expert, and be available in case of study delays	Observe group process, and give feedback on longterm development of students	Start group process, then make themselves obsolete	Stimulate understanding and monitor well-being	Provide feedback on personal development and stimulate perspective-taking
Role of medical school	Offer stimulating cases to challenge students	Match study assignments with the assessments	Provide trust and autonomy to study groups	Offer tailored practice opportunities	Offer opportunities to practice clinical reasoning skills	Develop the person behind the doctor and gain a broad understanding of the medical field

Chapter 4 presented a stimulated recall study conducted among fifteen second-year students to advance understanding in-class student engagement processes (3). We observed and recorded a single teaching session from two different study groups and selected critical moments of apparent engagement and disengagement. These moments served as prompts for subsequent interviews. Utilizing the multidimensional framework of student engagement (4), we discovered three main findings. First, we found that the cognitive, behavioral, and emotional dimensions were interrelated in a spiral-like manner. We called this the spirals of engagement and disengagement. Students who engaged in one dimension tended to become engaged in other dimensions as well (spiraling upwards). Similarly, once they were disengaged on one dimension, students tended to become disengaged on other dimensions as well (spiraling downwards). Second, while earlier research had identified various factors (or antecedents) that influence student participation in the classroom, the precise mechanism through which these antecedents exert their influence has remained unclear. We found that students internally weighed these antecedents prior to the start of a class, and the outcome of that process determined students' willingness to engage in class. Consequently, how willing a student was to engage in class, was to some extent determined before class. Furthermore, we noted that not all the reported antecedents were under the direct control of teachers, limiting their influence on students' willingness to engage. Third, we have identified the role of intentions as a contributing factor to the challenge that teachers faced in accurately assessing whether their students were engaged or disengaged. We confirmed previous findings that similar observable behaviors could be indicative of both engagement and disengagement (e.g., a student answering a question). However, our study revealed that it was the intention behind the behavior that determined whether it signified engagement or disengagement (e.g., to contribute to a discussion and understanding, or just to move the class along and hope for its quick ending). This study illuminated the dynamic process of in-class student engagement, highlighting the difficulty for teachers to accurately recognize and influence their students' engagement.

Teachers' perspectives on active learning

Chapter 5 of this thesis addressed the teachers' perspectives on active learning. In it, we reported on an interview study employing a constructivist grounded theory approach among eleven teachers, who were demonstrably experts in consistently achieving high levels of student engagement (29). We constructed a grounded theory of expert teaching practice, describing student engagement as an integrated process consisting of three components, each with three subcomponents. First, participants described their aim of cultivating a supportive learning environment, consisting of psychological safety, a clear and shared classroom structure, and mutual care and commitment. Second, they reported employing a personal educational approach that they had developed through learning from faculty development initiatives, practical experiences, and experiments in their own classes. In their approach, participants balanced their own educational beliefs and competencies, course design elements, and the knowledge of their students. Third, and finally, they described how, during their classes, they were continuously involved in a process of observing, analyzing,

and deciding on a course of action to facilitate the active learning process. While these findings acknowledge the need for extensive general competencies, they also demonstrate the need for contextual awareness, since teachers themselves, their students, and the courses they are involved in may influence student engagement in an active learning process. Taken together, the theory we constructed encourages faculty development initiatives to adopt a comprehensive, context-sensitive approach to prepare (new) medical teachers to teach in ways that engage students optimally.

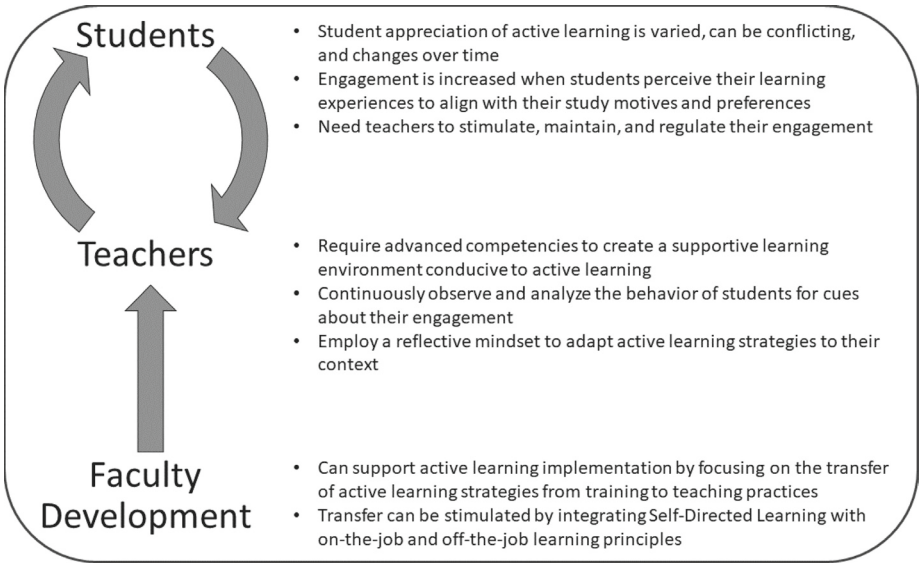
Faculty development perspective on active learning

The faculty development perspective on active learning was addressed in Chapter 6. This chapter reported on a Design-Based Research study in which we designed, implemented, and evaluated a training for new medical teachers in a small-group active learning course (36). The design of the training was informed by findings from our previous studies. We collected quantitative data through surveys and qualitative data through observations and interviews. The training focused on stimulating the transfer of knowledge and skills from the training to participants' teaching practice, as previous research identified that transfer is often less than optimal. We integrated Self-Directed Learning with on-the-job and off-the-job learning activities and found that this approach stimulated transfer in three ways: 1) autonomy in creating personal learning objectives and learning process increased motivation to transfer, 2) peer, supervisor, and student support encouraged the adoption of new teaching strategies, 3) integrating on-the-job experiences and off-the-job meetings promoted a continuous learning cycle of experiencing, reflecting, understanding, and applying. Based on the findings, we concluded that the design was feasible, effective, and responsive to the needs of the participants. It stimulated the transfer of active learning competencies to the teaching practices of new medical teachers. This study provided insights into how faculty development initiatives can efficiently support teachers in implementing active learning.

Synthesis of findings: an integrated perspective on active learning implementation

The findings from the three perspectives underscore the central problem addressed in this thesis: while active learning can enhance student learning in medical education, it requires student engagement, which can be difficult to achieve. However, our findings also inform a way forward. The interaction between students and teachers was repeatedly identified as a critical factor for optimal student engagement. We have uncovered new insights that can enhance this process. Faculty development can support teachers in developing their competencies in this interaction process through targeted training. Figure 7.1 visualizes how we combined the findings from the three perspectives into an integrated perspective.

Figure 7.1. Visualization of an integration of students, teachers, and faculty development perspectives on active learning



The integrated perspective addresses the three challenges to the implementation of active learning in medical education that we identified in the general introduction of this thesis. First, although medical students generally appreciate active learning, their engagement may vary. How can their engagement be optimized? Second, although teachers play a pivotal role in active learning, their competencies in this area may need improvement. Which knowledge, skills, and attitudes are essential for engaging students optimally? Third, faculty development can train teachers in essential active learning competencies, but the transfer of these competencies poses a problem. How can teachers be stimulated to apply the lessons learned during training in their teaching practice? In the following paragraphs, we will describe how the findings of this thesis address these challenges. We will incorporate findings from previously published research to show how our work contributes to the implementation of active learning.

Active learning requires students to engage meaningfully with the study content to be effective and stimulate students to construct their understanding (5–9). However, despite understanding the value of active learning for their development, medical students can be reluctant to engage (i.e., stay disengaged) in active learning methods. This reluctance increases when students perceive these methods as an ineffective or inefficient use of study time, when they do not contribute to students' educational goals, when the methods are not appealing, or when they believe that active learning is not adequately implemented (10–16). In other words, students' perceptions of their development through active learning matter.

The two Q-methodology studies have illuminated these perceptions of active learning. Our primary finding was that medical students vary in their appreciation of small-group active learning, and can have conflicting motives and preferences for learning in such settings, resulting from differences in epistemic beliefs and approaches to learning (1,12,13,17–21). This finding contributes to understanding why teachers can experience mixed success in engaging their students. Their teaching approach or the design of the course may be more aligned with students in one profile than in another.

A secondary finding was the dynamic nature of student appreciation of small-group active learning (2). It changes over time, along with students' development of epistemic beliefs and approaches to learning. This finding is consistent with previous research, suggesting that students' expectations of themselves and their learning environment change as they advance in their studies (12,22–28). As students advance, there is a corresponding growth in their knowledge and skills, personal and professional attributes. This growth results in more sophisticated beliefs about knowledge and learning, refined study strategies, and altered expectations from the learning environment (12,28). This finding contributes to the notion that students at different stages of a study program may have distinct needs and preferences for active learning methods.

In our integrated perspective, the interaction between students and teachers is identified as a critical factor for achieving optimal student engagement. Consequently, the challenges that became apparent due to the varied, conflicting, and changing needs of students, call for advanced teaching competencies to cultivate an active learning environment in which all students can engage. During their interviews, expert teachers revealed their strategies for navigating these challenges (29). We zoom in on one component highlighted in the constructed theory of expert teaching practice. For expert teachers, getting to know their students was always the first step. They would ask, for example, what their students needed from them as teachers and about their experiences in previous similar classes. This step provided them with valuable information about their students' diverse and potentially conflicting needs, while also considering the course requirements and their own didactical and pedagogical beliefs. This information informed the next step: establishing agreements with the students on how to make the class a success for everyone. Following this, they would commit to doing what was agreed upon and regularly seek feedback on the active learning process. Thus, by listening to students and addressing their needs, the teachers worked to overcome any reluctance that may have been present at the start. By regularly seeking feedback and adjusting their approach as needed, they maintained high levels of engagement. In conclusion, by acknowledging that students may have varied, conflicting, and changing needs, and incorporating these needs into their teaching approach, expert teachers were able to optimally engage their students during their interactions.

Our third study, the stimulated recall study, confirmed the critical importance of constructive interactions between teachers and students in fostering student engagement

(10,11,15,30–35). We observed that students engaged and disengaged multiple times during a two-hour class (3). Students reported that they needed their teacher to stimulate, maintain, and regulate their engagement. In our study, we identified how teachers can make use of the spirals of engagement for this purpose. Such a spiral could start from any of the student engagement components (i.e., cognitive, behavioral, and emotional), opening up a wide range of opportunities to enhance engagement. However, students were also observed to spiral into disengagement. Insights from the expert teachers highlighted the importance of continuous observation and analysis of their students (29). These experts were aware of the dynamic nature of student engagement and the frequent occurrence of student disengagement. Consequently, by observing and analyzing, teachers were able to quickly see students disengage and think of ways to re-engage them.

The ability to re-engage students during an interaction requires that teachers accurately assess when students disengage and possess appropriate strategies to address such situations. However, distinguishing engagement from disengagement proved difficult. Additionally, addressing student disengagement demanded context- and interpersonal sensitivity, as an inconsiderate approach could increase disengagement. Expert teachers used their knowledge of students to identify instances and causes of disengagement. Furthermore, these teachers took on a relational approach to student disengagement. In instances of repeated disengagement, they initiated a conversation with students to understand the underlying reasons for their disengagement, because they experienced there usually were. This understanding facilitated making agreements with students on how to proceed, thereby re-engaging them in a manner that considered the specific context and circumstances.

When inquiring how the teachers of the fourth study became experts in student engagement, they pointed toward faculty development initiatives as a valuable resource for acquiring knowledge about active learning strategies. However, they noted that these initiatives typically provided general strategies. After participating in faculty development, the teachers had to reflect on how to apply these strategies, to ensure that strategies aligned with their educational beliefs and competencies, were suitable for specific student groups, and fit within the constraints of the course they were teaching. Thus, from learning about 'what might work', they had to 'make it work for themselves'. This prompted teachers to conduct small-scale 'experiments' to ascertain the effectiveness and appropriateness of a strategy in their context and to gain experience using that strategy.

The process of applying strategies in a different context than where they were learned is called 'transfer', a major challenge in faculty development (35,36). In our fifth and final study, we shifted our focus from understanding (through the first four studies) to applying. We specifically concentrated on the supporting role that faculty development can play in the implementation of active learning. Therefore, we set out to discover how to stimulate the transfer of active learning strategies to participants' teaching practices. We designed, implemented, and evaluated a training for new medical teachers, employing principles of

Self-Directed Learning, and on-the-job and off-the-job learning activities (36). Learning to engage students was a challenge that was repeatedly set as a personal learning objective and examined during meetings. Through collaborative reflection on specific instances and creating awareness of essential aspects of those instances, participants achieved an increased understanding of student (dis)engagement. This understanding then facilitated the development of strategies aimed at stimulating engagement. Subsequent support from peers, supervisors, and faculty developers encouraged participants to apply these strategies, as teachers sometimes felt insecure about doing something new. Thus, the faculty development initiative we designed stimulated the transfer of active learning strategies by creating opportunities for teachers to engage in a cycle of obtaining authentic experiences, engaging in collaborative reflection, gaining in-depth understanding, and applying the lessons learned (36).

In conclusion, the integrated perspective synthesizes the findings from the five studies conducted in this thesis, thereby addressing its central research question. First, we advanced theoretical understanding of the dynamic nature of in-class student engagement and identified how students' epistemic beliefs and approaches to learning influence their appreciation of active learning. This advanced understanding of student engagement enables teachers to make better-informed decisions in their teaching practices. Second, we advanced understanding of active learning implementation by constructing a grounded theory that revealed how expert teachers consistently achieve high levels of student engagement in their classes. This theory emphasizes the importance for medical teachers and faculty development in considering the complexity of student engagement and adopting a comprehensive, context-sensitive approach. Third, we have used the knowledge gained in the first four studies to inform the design of a faculty development initiative that was focused on stimulated transfer. By combining self-directed learning, on-the-job learning, and off-the-job learning, new teachers felt supported, prepared, and guided in their roles as facilitators of their students' active learning processes.

Practical implications

To improve the implementation of small-group active learning in medical education, the findings of this thesis indicate that a comprehensive and context-sensitive approach is needed. Although our focus has been on teachers, faculty development, and students, we recognize that other stakeholders (such as management, course coordinators, and policymakers) contribute to the successful implementation of active learning. From the recommendations below, these stakeholders can infer insights into how they can contribute. However, consistent with our research approach, the recommendations are primarily written for teachers, faculty development, and students.

For teachers

Meta-conversations

The results of our research suggest that students may need guidance to recognize the value of active learning for their development. Given that students' appreciation of active learning can vary and may even conflict, and considering that their appreciation changes over time, we suggest that teachers initiate 'meta-conversations' at the beginning of a course. These conversations could include the what, how, and why of a course, and stimulate students to voice their expectations and needs, making the learning process an object of attention in the classroom. Particular emphasis should be placed on the role of active learning in the course: why is it used, how does it contribute to student development, which specific method is being used, and what can students expect from this approach (1,2)? This suggestion enriches previously established recommendations for a 'first day of class', which advise presenting basic information about the structure, requirements, and assessment of the course, providing personal introductions, and establishing rapport (37,38). As a result of this suggestion, students' understanding of the reasons behind the design of the course and how it will help them achieve its learning objectives may be enhanced, along with their willingness to engage (3,33). Furthermore, by eliciting students' expectations and needs, teachers can show their interest in their students and stimulate students to take initiative in deciding on certain aspects of the learning environment, such as the rules of engagement. Relatedness and autonomy support have previously been identified as a way to foster student engagement (39). This recommendation of meta-conversations is consistent with our constructed theory of expert teaching practice, in which experts created a supportive learning environment by negotiating a clear and shared classroom structure in which students can optimally engage and tailor their approach to meet the needs of students (29).

Appreciative approach

In the research of this thesis, students reported being more engaged when they felt appreciated by their teacher. Positive feedback, encouragement, and other types of support which recognized students' contributions to the active learning process stimulated student engagement. On the contrary, negative or judgmental interactions, such as criticism or inconsiderate responses to student behavior, tended to decrease engagement (1–3). Similarly, the expert teachers reported that they had adopted an appreciative approach toward their students' diverse needs, backgrounds, and expectations. This approach cultivated a sense of psychological safety for students and reflected their care for students' well-being and development (29). Therefore, an appreciative approach can help to create a learning environment that fosters a positive atmosphere, positive emotions, and a sense of belonging, all of which strengthen the emotional component of student engagement (4).

Reflective mindset

The expert teachers in this thesis had adopted a reflective mindset to teaching (29). They asked themselves, 'which approach might be effective in this context, taking into account

my own set of values and competencies, the characteristics of my students, and the specifics of the course I am involved in?', recognizing the contextual nature of student engagement. These teachers had experienced that engaging students in active learning did not follow a cookbook approach, in which a prearranged method of teaching led to optimal student engagement. Consequently, they deviated from the course manual to tailor learning activities, course structure, and other aspects of their teaching to better fit their needs and the needs of their students (1–3). Consistent with the previous recommendation, we suggest that teachers include the voice of the student and elicit student perceptions of their learning in the course. This suggestion supplements the concepts of 'reflective teaching' or 'reflective practice', which has been described as a method of achieving increasingly effective teaching practices through continuous self-reflection (40,41). We suggest that teachers include reflections about their impact on their students' engagement in their reflective practices.

Adaptability

Beyond the contextual nature of student engagement and adopting a reflective mindset, small-group active learning requires teachers to use their knowledge and skills flexibly to deal with unexpected situations. In all our studies, we encountered situations in which such flexibility was demanded. Examples included students who felt overwhelmed by an exam earlier in the day, teachers who experienced technical problems, classroom designs unsuitable for small-group collaborations, etc. We do not believe that general practical solutions are the answer (such as 'do not plan small-group active learning sessions after an exam', 'before starting a class make sure the technology is working', and 'switch to another classroom if it is set up for large lectures with fixed desks and chairs'). It seems that unexpected situations are common and that expert teachers can make judgments on the spot to attend to them (29). Through their continuous observation and analysis of the behavior of their students, they can intervene quickly if necessary. The ability to adapt to unexpected or changing circumstances is called 'adaptive expertise' in educational literature and clinical practice (42). It is beyond the scope of this thesis to go in depth on how to develop this competency. We refer to a scoping review that conceptualized adaptive expertise into a framework of predisposing (beliefs and attitudes, knowledge), enabling (skills, resources, social and physical environment), and reinforcing (reminders, feedback) factors, offering suggestions on how to develop this competency (43).

For faculty developers

Employ the constructed theory of expert teaching practice

The theory of expert teaching practice that we constructed provides a comprehensive understanding of how expert teachers stimulated high levels of student engagement. It not only describes the required competencies of teachers but also how they are related and jointly influence student engagement (29). The theory could inform the design of faculty development initiatives and support medical teachers who want to teach in ways

that consistently engage their students. Additionally, by adhering to the theory, faculty development initiatives can appreciate the complex and contextual nature of student engagement and create opportunities for teachers to develop their personal educational approach.

Focus on transfer

Faculty development initiatives are frequently limited in time and scope (44–47). Sometimes they are as short as one hour and focus on one active learning strategy. Although they can be effective in developing the knowledge and skills of participants, such approaches may not be sufficient to change the behavior of teachers and influence student engagement (36). Student engagement, as investigated in this thesis, seems to be an interactive, dynamic, and contextually dependent process. Therefore, teachers must translate the general workings of an active learning strategy into their context (36). From the expert teachers in this thesis, we learned that once they acquired a skill or strategy, they personalized it for use in their teaching practice. After each use, they reflected on their experiences and perhaps modified some aspects to better fit their needs and those of their students (29). As confirmed in the Design-Based Research study we conducted in this thesis, faculty development initiatives can support this transfer of knowledge and skills, and along with it, increase their impact (36,48,49). Based on our research, we have two suggestions to stimulate transfer. First, our suggestion is to design initiatives in such a way that participants can learn a strategy or skill, prepare to use it in their context, apply it, gain experience, and offer opportunities to discuss and reflect on their findings with peers and trainers. Second, the combination of Self-Directed Learning, off-the-job learning, and on-the-job learning can stimulate transfer by strengthening teachers' autonomy and flexibility to pursue personally relevant goals, and creating structured learning environments that use authentic experiences as a foundation (36,49–51). Both these suggestions imply ongoing support and coaching, which we acknowledge might be difficult to implement (45,46).

For students

Finally, the students. We are hesitant to propose a recommendation for medical students. First, because students are not a target audience for this thesis. This thesis might therefore not be the right place to suggest a course of action for them. However, we have gained valuable insights from speaking with and about students. We have heard how medical students care about their education and foresee futures in which teaching is a part of their career. This thesis might then be a valuable resource for them. Second, although progress has been made, the perception of students as consumers or clients is pervasive (52,53). This viewpoint suggests that faculty has to do the work and perhaps even do their best to please students, and that it is not appropriate for students to be responsible for their learning. This notion fits a traditional, teacher-centered approach to education: teachers teach, and students receive that teaching (53,54). However, as was the foundation of this thesis, for active learning to be effective, students need to be involved in the learning process. This requires a student-centered approach in which students share in the responsibility

for the learning (53,55–57). Teachers can cultivate learning environments conducive to active learning, it is the students who have to engage in that environment. Therefore, we encourage students (both invited and uninvited) to express their opinions, concerns, beliefs, and provide feedback to teachers. This involves students in decision-making processes, educational improvements, and quality processes (52). It also directly influences their engagement during the active learning process, as teachers can adapt the learning processes to their input. The concepts of 'student agency' and 'agentic engagement' are closely related to this suggestion (58,59). They refer to the notion that students proactively express themselves to positively influence their learning environments.

Methodological reflections

The strengths of this thesis are the combination of various qualitative and mixed-methods research designs used to study three perspectives: students, teachers, and faculty development. Together, they have achieved a comprehensive understanding of student engagement in active learning. We were able to study this topic longitudinally through the two Q-studies and the DBR-study, which allowed us to track how student appreciation of active learning changed over time (Q-studies) and to improve upon the faculty development initiative we designed (DBR-study). We also constructed a theory of how expert teachers stimulated student engagement. Lastly, we were able to integrate the empirical findings of the first four studies into the fifth study (the faculty development initiative), so that we contributed to bridging the theory-practice gap that is present in educational research (60,61).

When considering the limitations, our first focus is on the scope of this thesis. We have focused on student engagement in active learning, the interaction between students and teachers, and the supporting role of faculty development. However, through our studies and reading active learning literature, we realize that other factors within and beyond the classroom influence the adoption and implementation of active learning. Included in those factors are teacher identities, cultural aspects, curriculum design, policy, legislation, and organizational issues (4,10,34,62–65). As there are no hard borders between these factors, we have sometimes touched upon those factors, but each factor deserves full attention to further optimize the implementation of active learning in medical curricula.

Another general limitation has to do with transferability. We employed strategies to enhance the transferability of findings to other contexts than the one in which the research was conducted. We provided detailed descriptions of the research setting, samples, and research approach, engaged in reflexivity, and were transparent in data collection instruments. However, these strategies do not guarantee the value of our findings and implications in other contexts. We urge careful consideration of our findings before applying them elsewhere.

The methods we used were all primarily based on self-report. We asked students about active learning and their engagement in active learning methods. We asked expert teachers how they taught in ways that engaged their students. We asked new teachers how the faculty development initiative stimulated them to transfer the lessons they learned to their actual teaching practices. Self-report is known for bias, in that participants can give, for example, social-desirable answers (66,67). Moreover, using complementary data collection methods may have yielded additional or different results. Lastly, the methods we used limited us in claiming causality or effectiveness in our findings. We could only report on what the participants said.

For the Q-Studies in particular, there could be a response bias, as certain parts of the student population are more likely to participate in educational studies. More specifically, students who are not interested in active learning are likely to avoid participating in a study on this topic. The snowballing procedure we employed might have yielded more participants who are more alike, rather than representing a different viewpoint. We used sampling strategies to include participants who may be less likely to participate, but we are unsure of how successful this was.

Future research

Student engagement in active learning is a complex and dynamic process with a large contextual component. What works in one setting, for one teacher, in one course, with one group of students, might be less effective in another. We encourage teachers, faculty developers, researchers, and other educational professionals to apply our findings to their contexts, to test them, and to further develop them. Although this research has been conducted in medical education, other study programs have also adopted active learning in their curricula. It would be interesting to determine if the results are applicable in those settings.

Our research has been constructivist in design, trying to understand student engagement in active learning from different perspectives. Although implications have been given, to make causal claims or claims about (comparative) effectiveness, our findings need to be tested. Therefore, we suggest that future research use our findings to develop and implement strategies to stimulate student engagement, and measure their effects.

Lastly, although we researched students in three of our studies, included students as stakeholders in the design-based research study, and incorporated a recommendation in this chapter to further their position as partners in education, our focus was on supporting teachers in the implementation of small-group active learning. However, students play an increasingly important role in education (56). Therefore, future research can ask a question, similar to the one we asked: *"How can medical students be supported in engaging in small-group active learning in such a way that their learning is optimized?"* Just as our research has yielded theoretical and practical insights for educational professionals, such a research endeavor could yield equally valuable insights for students.

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APPENDICES

SUMMARY

Medical education has adopted active learning as a fundamental teaching and learning strategy due to its potential to enhance student learning. However, faculty and students often encounter difficulties implementing active learning into their educational practices, reducing effectiveness. A major contributor to active learning effectiveness is student engagement. Stimulating this engagement can be complex and challenging. Therefore, in this thesis, we aim to improve the implementation of active learning by deepening our understanding of the student engagement process and illuminating how teachers can optimize it.

Chapter 1
In chapter 1, the general introduction of this thesis, we introduce the concepts of active learning and student engagement. Both concepts are defined, findings from the literature are highlighted, and critical reflections are provided. We conclude this part of the introduction by stating that active learning can work, but how it is implemented matters. The focus then shifts to medical education and how active learning is implemented there. We describe that active learning plays a fundamental role in the typically employed teaching and learning strategies and identify three challenges regarding implementation. First, medical students generally appreciate active learning, but their engagement varies. How can their engagement be optimized? Second, teachers play a pivotal role in engaging students, but may need to develop competencies to effectively do so. Which knowledge, skills, and attitudes are essential? Third, faculty development can develop teachers' competencies, but incorporating these competencies into educational practice proves difficult. How can the transfer of competencies from training to practice be stimulated? From there, we continue with the overarching objective and central research question of this thesis: *"How can medical teachers be supported in implementing small-group active learning into their teaching practices in such a way that student engagement is optimized?"* We contextualize the conducted research and introduce our methodological approach, which is based on a constructivist research paradigm and a combination of qualitative and mixed-methods research designs. The chapter concludes with a reflexivity paragraph and an overview of the thesis.

Chapter 2
Chapter 2 marks the start of our research into students' perspectives on active learning. The chapter presents findings from a Q-methodological study conducted among first-year medical students. The study aims to explore the variety in medical students' appreciation of small-group active learning, based on their epistemic beliefs and approaches to learning. In this study, 52 participants completed a Q-sorting procedure and provided elaborations on their viewpoints. The analyses, employing a by-person factor analysis, identified four student profiles, each representing a shared perspective of a group of students. We characterized the profiles as 1) understanding-oriented students, 2) assessment-oriented students, 3) group-oriented students, and 4) practice-oriented students. Each profile was distinguished by

distinct study motives and preferences about the learning process, related to students' epistemic beliefs and their approaches to learning. The research revealed variations in when students appreciated active learning as a teaching and learning strategy and how they perceived their roles and responsibilities in the learning process, those of their study groups and their teachers, and their expectations of the medical school. Students reported increased engagement when their educational experiences aligned with their specific profile. The identification of the four profiles offers a valuable insight into the challenges of engaging all students in a class: they have different and sometimes conflicting needs. The four profiles can help teachers make better-informed decisions about designs and teaching practices for active learning settings.

Chapter 3

Chapter 3 of the thesis describes a follow-up Q-methodological study conducted three years after the initial study (chapter 2) to explore whether, how, and why student appreciation of active learning changes during a bachelor's program. The study procedure was repeated with twenty students from the original sample, and seven of these students participated in a subsequent interview to reflect on any changes in their appreciation of small-group active learning since their start of medical training. We identified two new profiles, which we characterized as 1) success-oriented students and 2) development-oriented students. Given a high correlation between the factors of the initial and this follow-up study, it was concluded that the appreciation of active learning remained fairly stable over time, although key aspects related to students' epistemic beliefs and approaches to learning developed, resulting in the emergence of the two new profiles. The interviews revealed several factors that contributed to the observed changes. These factors included personal growth, interpersonal aspects, teacher influence, and curricular aspects. The research shows that as students progress through their studies, their active learning needs change, necessitating a modified educational approach to ensure sustained student engagement. Based on the findings of this study, we advise monitoring and regularly checking with students what engages them and a program-level approach to student engagement as changes occur over a longer period of time.

Chapter 4

Chapter 4 presents a stimulated recall study conducted with fifteen second-year students to advance understanding of in-class student engagement processes in small-group active learning settings. In this study, a framework is used that views student engagement as a multidimensional concept that includes behavioral, cognitive, and emotional components. Data were collected by observing and video-recording a small-group active learning session from two study groups, followed by semi-structured interviews. In the interviews, fragments of the recordings were used as prompts to reflect on moments of apparent engagement and disengagement. The study yielded three main findings. First, the cognitive, behavioral, and emotional components of student engagement were found to be interconnected in a spiral-like fashion. Students who engaged in one dimension tended to become engaged in the

other dimensions as well, and vice versa for disengagement. Second, students determined before class, based on various personal, social, and educational antecedents, how willing to engage in class they would be. Third, the study highlighted the importance of the intentions behind students' observable behaviors, as it was found that similar behavior could indicate both engagement and disengagement. This study illuminates the dynamic process of student engagement and underscores teachers' difficulties in recognizing and influencing student engagement in class. Based on the importance of intentions, which are not always visible to teachers, the study advises teachers to observe their students carefully and initiate interaction using open and inviting prompts.

Chapter 5

Chapter 5 addressed the teachers' perspectives on active learning. It describes an interview study using elements from appreciative inquiry conducted among eleven teachers, identified as experts in consistently achieving high levels of student engagement in a small-group active learning setting. The aim was to uncover ways in which these teachers stimulate student engagement. We used a constructivist grounded theory approach, which resulted in a theory of expert teaching practice, describing student engagement as an integrated process with three main components. First, teachers aimed to cultivate a supportive learning environment characterized by psychological safety, a clear and shared classroom structure, and mutual care and commitment. Second, teachers employed a personal educational approach, balancing their educational beliefs and competencies, course design elements, and knowledge and beliefs about their students. Third, teachers demonstrated proficiency in facilitating the active learning process, which included continuously observing and analyzing their students, and consequently decided on an appropriate course of action. The theory highlights the need for extensive active learning competencies to cultivate a supportive learning environment and facilitate the active learning process. However, it also points to the contextual nature of student engagement, reflected in their context-sensitive and reflective personal educational approach. The insights from this study can inform faculty development initiatives, equipping teachers to engage their students.

Chapter 6

In chapter 6 we considered a faculty development perspective on active learning. We report on a design-based research study we conducted among 34 new medical teachers. This study aimed to train participants to teach a course employing small-group active learning. Its objective was to design, implement, and evaluate a faculty development initiative that specifically focused on stimulating transfer, enabling teachers to apply the lessons learned in their teaching practices. The design of the faculty development initiative was informed by findings from previous studies. Data were collected from two iterations of the initiative through observations, surveys, and interviews. We analyzed the data using a combination of inductive and deductive methods. The initiative integrated Self-Directed Learning principles with on-the-job and off-the-job learning activities, and we found that this approach stimulated transfer in three ways. First, autonomy in creating personal learning

objectives and learning processes increased motivation to transfer. Second, the support of peers, supervisors, and students encouraged the adoption of new teaching strategies. Third, combining on-the-job and off-the-job learning activities promoted a continuous learning cycle of experiencing, reflecting, understanding, and applying. We concluded that the design was feasible, effective, and responsive to the needs of the participants, stimulating the transfer of active learning competencies to educational practice. Faculty development can use the approach we used, as teaching a small-group active learning course can be challenging, especially for new teachers.

Chapter 7

The final chapter is the general discussion of this thesis. We summarize the findings from the students' perspectives, teachers' perspectives, and faculty development perspective on active learning. These findings are synthesized into an integrated perspective that emphasizes the importance of the interaction between students and teachers in optimizing student engagement in active learning, and describes how faculty development can offer support. The integrated perspective addresses the central research question of this thesis and provides a way forward for the three challenges identified in the general introduction. Practical implications are provided for the three perspectives we studied: students, teachers, and faculty development. Subsequently, methodological reflections on the strengths and limitations of our approach are provided. The main strengths focus on the use of various research designs to study the three perspectives to gain a comprehensive and actionable understanding of student engagement in active learning, while the main limitations acknowledge the scope, transferability, and potential bias in the studies. This chapter finishes with suggestions for future research, which hopefully inspire others to apply and test the findings in other contexts, as well as suggest a shift from researching teachers to researching students.

Conclusions

The findings presented in this thesis contribute to the implementation of active learning in medical education by optimizing student engagement. The investigation of the students' perspectives clarifies why medical students, who are generally appreciative of active learning, can be reluctant to engage. They have different and sometimes conflicting active learning needs, which also change over time, necessitating a modified educational approach as students progress through their studies. They also require the support of their teachers to stimulate, maintain, and regulate their engagement. The investigation of the teachers' perspectives illuminates how expert teachers fulfill their pivotal role in student engagement. It identifies the importance of cultivating a supportive learning environment and the need for extensive competencies to facilitate an active learning process. It identifies the need for teachers to employ a reflective and context-sensitive approach that balances their educational values and competencies, their knowledge and beliefs about students, and design elements of the course they are teaching. Finally, the investigation of a faculty development perspective demonstrates how a teacher training on active learning, that

integrates self-directed learning principles with on-the-job and off-the-job learning activities, can stimulate teachers to apply the lessons they learned during training in their teaching practices, addressing the transfer problem in faculty development.

Through the research conducted in this thesis, we have advanced theoretical understanding and offered practical implications to optimize student engagement in small-group active learning, transforming those small sparks into great fires.

SAMENVATTING

Activerend onderwijs kan ervoor zorgen dat studenten beter leren, en heeft daarom een fundamentele rol als onderwijsstrategie in het medisch onderwijs. Studentbetrokkenheid is belangrijk voor de effectiviteit van activerend onderwijs. Desalniettemin ervaren docenten en studenten vaak uitdagingen bij het implementeren van activerend onderwijs en het stimuleren van studentbetrokkenheid, wat de effectiviteit van activerend onderwijs kan verminderen. Het doel van dit proefschrift is daarom om de implementatie van activerend onderwijs te verbeteren door studentbetrokkenheid beter te begrijpen en docenten richtlijnen te bieden om hun activerend onderwijs te optimaliseren.

Hoofdstuk 1
In hoofdstuk 1, de algemene inleiding van dit proefschrift, introduceren we de concepten activerend onderwijs en studentbetrokkenheid. Beide concepten worden gedefinieerd, bevindingen uit de literatuur worden belicht, en kritische reflecties worden gegeven. Dit leidt tot de deelconclusie dat activerend onderwijs kan werken, maar dat hoe het wordt geïmplementeerd van belang is. De focus verschuift dan naar het medisch onderwijs en hoe activerend onderwijs daar wordt geïmplementeerd. We beschrijven dat activerend onderwijs een fundamentele rol speelt in veelgebruikte onderwijsmethoden en identificeren drie uitdaging met betrekking tot implementatie van activerend onderwijs in het medisch onderwijs. Ten eerste waarderen studenten geneeskunde activerend onderwijs in het algemeen, maar hun betrokkenheid is wisselend. Hoe kan hun betrokkenheid worden geoptimaliseerd? Ten tweede spelen docenten een cruciale rol bij het betrekken van studenten, maar om dit effectief te kunnen doen moeten ze mogelijk nog competenties ontwikkelen. Welke kennis, vaardigheden, en attitudes zijn essentieel? Ten derde kan docentprofessionalisering bijdragen aan de ontwikkeling van docentcompetenties, maar het blijkt lastig om deze competenties in de onderwijspraktijk te integreren. Hoe kunnen verworven competenties toegepast worden in de onderwijspraktijk? Van daaruit gaan we verder met het overkoepelende doel en de centrale onderzoeksvraag van dit proefschrift: *"Hoe kunnen docenten geneeskunde worden ondersteund bij het implementeren van activerend onderwijs in kleine groepen in hun onderwijspraktijk, zodanig dat studentbetrokkenheid wordt geoptimaliseerd?"* We contextualiseren het uitgevoerde onderzoek en introduceren onze methodologische aanpak, die is gebaseerd op een constructivistisch paradigma en een combinatie van kwalitatieve en *mixed-methods* onderzoeksmethodes. Het hoofdstuk eindigt met een paragraaf over reflexiviteit en een overzicht van het proefschrift.

Hoofdstuk 2
In hoofdstuk 2 begint ons onderzoek naar het studentperspectief op activerend onderwijs. In dit hoofdstuk presenteren we de bevindingen van een Q-methodologische studie, uitgevoerd onder eerstejaars geneeskundestudenten. Het doel van de studie was om te verkennen hoe geneeskundestudenten denken over activerend onderwijs. Aan deze studie deden 52 deelnemers mee, die een Q-sorteer procedure doorliepen en toelichting gaven op

hun standpunten. De factoranalyse op persoonsniveau resulteerde in de identificatie van vier studentprofielen, die elk het perspectief van een groep studenten vertegenwoordigden. We karakteriseerden de profielen als volgt: 1) verdiepingsgerichte studenten, 2) toetsgerichte studenten, 3) groepsgerichte studenten, en 4) praktijkgerichte studenten. Elk profiel onderscheidde zich door verschillende studiemotieven en voorkeuren voor het leerproces, en was gerelateerd aan verschillende epistemische overtuigingen en leerbenaderingen. Dit onderzoek toonde de verschillen tussen studenten in hun waardering voor activerend onderwijs. Ze zagen verschillende rollen en verantwoordelijkheden voor zichzelf, hun studiegroepen en hun docenten, en hadden andere verwachtingen van hun opleiding. Studenten rapporteerden een verhoogde betrokkenheid wanneer hun onderwijservaringen overeenkwamen met hun specifieke profiel. De vier profielen bieden inzicht in de uitdaging om alle studenten in een klas te betrekken: ze hebben verschillende en soms tegenstrijdige behoeftes. De vier profielen kunnen docenten helpen om geïnformeerde beslissingen te nemen bij het ontwerpen en doceren van activerend onderwijs.

Hoofdstuk 3

In hoofdstuk 3 beschrijven we een Q-methodologische vervolgstudie die drie jaar na de oorspronkelijke studie (hoofdstuk 2) werd uitgevoerd. Het doel was om te onderzoeken óf, hoe, en waarom de waardering van studenten voor activerend onderwijs veranderde gedurende de bachelorfase van de opleiding. De studieprocedure werd herhaald met twintig studenten uit de oorspronkelijke steekproef, waarvan zeven deelnamen aan een extra interview om te reflecteren op eventuele veranderingen in hun waardering van activerend onderwijs in kleine groepen sinds de start van hun studie. We identificeerden twee nieuwe profielen, die we karakteriseerden als volgt: 1) succesgerichte studenten en 2) ontwikkelingsgerichte studenten. Vanwege de hoge correlatie tussen de factoren van de oorspronkelijke en deze vervolgstudie, werd geconcludeerd dat de waardering van activerend onderwijs relatief stabiel bleef over de tijd, hoewel enkele fundamentele aspecten gerelateerd aan de epistemische overtuigingen en leerbenaderingen zich ontwikkelden, resulterend in de identificatie van de twee nieuwe profielen. Uit de interviews bleek dat meerdere factoren bijdroegen aan de veranderingen. Deze factoren omvatten persoonlijke groei, interpersoonlijke aspecten van het onderwijs, invloed van docenten, en kenmerken van de opleiding. De studie toont aan dat naarmate studenten verder komen in hun studie, hun behoeftes met betrekking tot activerend onderwijs veranderen, wat een aangepaste onderwijsaanpak vereist om continue studentbetrokkenheid te waarborgen. Op basis van de bevindingen van deze studie adviseren we om studentbetrokkenheid te monitoren en regelmatig te vragen aan studenten wat hun betrokkenheid kan stimuleren. Daarnaast adviseren we een aanpak op opleidingsniveau, omdat veranderingen zich voordoen over een langere periode.

Hoofdstuk 4

In hoofdstuk 4 presenteren we een *stimulated recall* studie die is uitgevoerd onder vijftien tweedejaars geneeskundestudenten. Het doel van de studie was om het proces van

studentbetrokkenheid tijdens een lessituatie beter te begrijpen. In deze studie werd studentbetrokkenheid gedefinieerd als een multidimensionaal concept, bestaande uit gedragsmatige, cognitieve, en emotionele componenten. We verzamelden data door twee studiegroepen tijdens activerend onderwijs te observeren en op video op te nemen, gevolgd door semigestructureerde interviews. Tijdens de interviews werden fragmenten van de opnames gebruikt als geheugensteun om te reflecteren op momenten van ogenschijnlijke betrokkenheid en afhaken. De studie leverde drie belangrijke bevindingen op. Ten eerste bleken de gedragsmatige, cognitieve, en emotionele componenten op een spiraalvormige manier met elkaar verbonden te zijn. Studenten die op één dimensie betrokken raakten, hadden de neiging om ook op de andere dimensies betrokken te raken, en vice versa voor afhaken. Ten tweede bepaalden studenten voorafgaand aan een les, op basis van verschillende persoonlijke, sociale, en educatieve factoren, hoe bereid ze waren om actief mee te doen in het leerproces. Ten derde benadrukte de studie het belang van de intenties achter het waarneembare gedrag van studenten, omdat we vonden dat vergelijkbaar waarneembaar gedrag kon passen bij zowel betrokkenheid als bij afgehaakt zijn. De intentie achter het gedrag maakte het verschil. Deze studie verheldert het dynamische proces van studentbetrokkenheid en benadrukt de uitdagingen van docenten bij het herkennen en beïnvloeden van studentbetrokkenheid tijdens een les. Op basis van deze studie adviseren we docenten om hun studenten zorgvuldig te observeren en op een open, uitnodigende wijze hun studenten te vragen naar hun betrokkenheid.

Hoofdstuk 5

Hoofdstuk 5 gaat over het docentperspectief op activerend onderwijs. We beschrijven een interviewstudie met vragen geïnspireerd door *appreciative inquiry*. De studie is uitgevoerd onder elf docenten die geïdentificeerd waren als experts in het consequent bereiken van een hoge mate van studentbetrokkenheid in hun activerend onderwijs met kleine groepen. Het doel was om te ontdekken hoe deze docenten studentbetrokkenheid stimuleerden. Hiervoor gebruikten we een constructivistische *grounded theory* benadering. Dit resulteerde in een experttheorie waarbij studentbetrokkenheid wordt beschreven als een geïntegreerd proces met drie hoofdcomponenten. Ten eerste werkten docenten aan een ondersteunende leeromgeving, gekenmerkt door psychologische veiligheid, een duidelijke en gedeelde klassenstructuur, en wederzijdse zorg en inzet. Ten tweede hanteerden docenten een persoonlijke onderwijsaanpak, waarbij ze rekening hielden met hun onderwijsopvattingen en competenties, het cursusontwerp, en kennis en opvattingen over hun studenten. Ten derde toonden docenten zich bekwaam in het faciliteren van het actieve leerproces, dat bestond uit het continu observeren en analyseren van hun studenten, en vervolgens te beslissen over een passende actie. De theorie benadrukt de noodzaak van uitgebreide competenties om een ondersteunende leeromgeving te kunnen creëren en het actieve leerproces te kunnen faciliteren. Tegelijkertijd wijst de theorie op de contextuele aard van studentbetrokkenheid, weerspiegeld in de context-sensitieve en reflectieve persoonlijke onderwijsaanpak. De inzichten uit deze studie kunnen docentprofessionaliseringsactiviteiten informeren, en zo docenten helpen hun studenten te betrekken.

Hoofdstuk 6

In hoofdstuk 6 besteden we aandacht aan het docentprofessionaliseringsperspectief. We rapporteren over een ontwerponderzoek, uitgevoerd onder 34 beginnende docenten geneeskunde. Deze studie richtte zich op het trainen van docenten om cursussen te kunnen geven die gebruik maken van kleinschalig activerend onderwijs. Het doel was om een training te ontwerpen, implementeren, en te evalueren specifiek gericht op het stimuleren van transfer, waardoor docenten de competenties die ze verworven in de trainingscontext gingen toepassen in hun eigen onderwijspraktijk. Voor het ontwerp van de training maakten we gebruik van bevindingen uit de eerdere studies. Er zijn twee iteraties van de training uitgevoerd, waarbij de data werd verzameld door middel van observaties, vragenlijsten, en interviews. We analyseerden de data met een combinatie van inductieve en deductieve analysemethoden. In de training werden principes van zelfgestuurd leren, werkplekleren, en cursorisch onderwijs geïntegreerd. We ontdekten dat deze aanpak transfer op drie manieren stimuleerde. Ten eerste zorgde autonomie bij het stellen van persoonlijke leerdoelen en leeraanpakken voor een verhoogde motivatie tot transfer. Ten tweede moedigde de ondersteuning van collega's, supervisoren, en studenten aan om nieuwe doceerstrategieën uit te proberen. Ten derde zorgde het combineren van werkplekleren met het cursorisch onderwijs voor een continue leercyclus van ervaren, reflecteren, begrijpen, en toepassen. We concludeerden dat het ontwerp haalbaar, effectief, en responsief was voor de behoeftes van participanten, en dat het de transfer van competenties voor activerend onderwijs naar de onderwijspraktijk stimuleerde. Docentprofessionalisering kan gebruik maken van de aanpak die wij hanteerden, aangezien het doceren van kleinschalig activerend onderwijs uitdagend kan zijn, vooral voor beginnende docenten.

Hoofdstuk 7

Het laatste hoofdstuk van dit proefschrift is de algemene discussie. Hierin vatten we de bevindingen van de studies naar het student-, docent-, en docentprofessionaliseringsperspectief op activerend onderwijs samen. Deze bevindingen worden vervolgens samengevoegd tot een geïntegreerd perspectief dat het belang van de interactie tussen studenten en docenten benadrukt bij het optimaliseren van studentbetrokkenheid bij activerend onderwijs. Het beschrijft ook hoe docentprofessionalisering ondersteuning hierbij kan bieden. Dit geïntegreerde perspectief geeft een antwoord op de centrale onderzoeksvraag van dit proefschrift en biedt richtlijnen voor de drie uitdagingen die in de algemene inleiding zijn geïdentificeerd. We geven praktische adviezen voor de drie perspectieven die we hebben bestudeerd: studenten, docenten, en docentprofessionalisering. Daarna reflecteren we op de sterke punten en beperkingen van onze methodologische aanpak. Een belangrijk sterk punt van dit proefschrift is de variatie aan gebruikte methodologieën, waardoor we veel verschillende aspecten konden belichten en een rijk beeld kregen van studentbetrokkenheid in activerend onderwijs. De voornaamste beperkingen betreffen de reikwijdte, overdraagbaarheid van bevindingen, en mogelijke bias in de studies. Het hoofdstuk eindigt met suggesties voor toekomstig onderzoek, die hopelijk anderen zullen

inspireren om de bevindingen in andere contexten toe te passen, en de focus van onderzoek te verleggen van docenten naar studenten.

Conclusies

De bevindingen die in dit proefschrift worden gepresenteerd, dragen bij aan de implementatie van activerend onderwijs in het medisch onderwijs door het optimaliseren van studentbetrokkenheid. Het onderzoek naar het studentperspectief maakt duidelijk waarom geneeskundestudenten, die over het algemeen activerend onderwijs waarderen, terughoudend kunnen zijn in hun betrokkenheid. Ze hebben verschillende en soms tegenstrijdige behoeftes voor activerend onderwijs, die ook in de loop van de tijd veranderen, wat een aangepaste onderwijsaanpak vereist voor studenten in verschillende fases van hun studie. Ze hebben ook de steun van hun docenten nodig om hun betrokkenheid te stimuleren, te behouden, en te reguleren. Het onderzoek naar het docentperspectief laat zien hoe expert docenten hun cruciale rol in studentbetrokkenheid vervullen. Hieruit blijkt het belang van uitgebreide docentcompetenties om een ondersteunende leeromgeving te kunnen creëren en een actief leerproces te kunnen faciliteren. Het onderzoek toont ook de noodzaak voor docenten om een reflectieve en context-sensitieve onderwijsaanpak te hanteren waarbij ze rekening houden met hun eigen onderwijsopvattingen en competenties, het cursusontwerp, en kennis en opvattingen over hun studenten. Ten slotte illustreert het onderzoek naar het docentprofessionaliseringsperspectief hoe een training over activerend onderwijs, waarbij zelfgestuurd leren geïntegreerd werd met werkplekleren en cursorisch onderwijs, docenten kan stimuleren geleerde lessen toe te passen in hun onderwijspraktijk. Dit draagt bij aan het verminderen van het transferprobleem.

Met het onderzoek dat voor dit proefschrift is uitgevoerd hopen we bij te dragen aan de implementatie van activerend onderwijs, en zo die vonken van studenten te transformeren in grote vlammen.

PHD PORTFOLIO

Publications

1. **Grijpma JW**, Ramdas S, Broeksma L, Meeter, M, Kusurkar RA, de la Croix A. Learning from the experts: Stimulating student engagement in small-group active learning. 2024;13(1):229-238.
2. De la Croix A, Stoffels M, **Grijpma JW**. Behind the scenes of qualitative analysis: learning from new researchers' struggles. In: Rees EL, Ledger A, Walker KA. Starting research in clinical education. Starting research in clinical education. 1st ed. Hoboken, NY: Wiley-Blackwell; 2023. P. 175-181.
3. **Grijpma JW**, de la Croix A, Meeter M, Kusurkar RA. Changes in student appreciation of small-group active learning: A follow-up q-methodological study. International Journal of Educational Research Open. 2022;3:100199.
4. **Grijpma JW**, Mak-van der Vossen M, Kusurkar RA, Meeter M, de la Croix A. Medical student engagement in small-group active learning: A stimulated recall study. Med Educ. 2022;46(4):432–443.
5. Kusurkar RA, Mak-van der Vossen M, Kors J, **Grijpma JW**, van der Burgt SME, Koster AS, et al. 'One size does not fit all': the value of person-centred analysis in health professions education research. Perspect Med Educ. 2021;10(4):245–51.
6. **Grijpma JW**, de la Croix A, Kleinveld JH, Meeter M, Kusurkar RA. Appreciating small-group active learning: what do medical students want, and why? A q-methodology study. Med Teach. 2021;43(4):411–20.

Publications in progress

1. **Grijpma JW**, de la Croix A, Dolmans DHJM, Meeter M, Grooten RHJM, Kusurkar RA. Preparing medical teachers for small-group active learning: a design-based research study focusing on transfer. Submitted
2. Dijkstra F, **Grijpma JW**, de la Croix A, van Schuppen H, Meeter M, Renden PG. : Challenge or threat? A Q-methodological study into nursing students' perceptions on learning to collaborate under stress. Submitted

Conference contributions

1. **Grijpma JW**, de la Croix A, Meeter M, Kusurkar RA. Medisch studenten waarderen activerend onderwijs anders over tijd: een follow-up Q-methodologische studie. Paperpresentatie. ORD conference 2024.
2. **Grijpma JW**, Ramdas, SKK, Broeksma, LA, Meeter M, Kusurkar RA, de la Croix A. Leren van expert docenten: hoe bereiken zij hoge studentbetrokkenheid in activerend onderwijs? Paperpresentatie. ORD conference 2024
3. **Grijpma JW**, de la Croix A, Meeter M, Kusurkar RA. Medisch studenten waarderen activerend onderwijs anders over tijd: een follow-up Q-methodologische studie. Onderzoekspaper. NVMO conference 2024.

4. **Grijpma JW**, Ramdas SKK, Broeksma LA, Meeter M, Kusurkar RA, de la Croix A. Learning from expert teachers: hoe bereiken zij hoge studentbetrokkenheid in activerend onderwijs? Onderzoekspaper. NVMO conference 2024.
5. **Grijpma JW**, de la Croix A, Meeter M, Kusurkar RA. Does student appreciation of small-group active learning change over time? A follow-up Q-methodological study. Short communication - on demand. AMEE conference 2023.
6. Mak-van der Vossen MC, van Moppes NM, Ramdas SKK, Isik U, **Grijpma JW**. Inclusief taalgebruik in medisch onderwijsonderzoek. Workshop. NVMO conference 2023.
7. **Grijpma JW**, Mak-van der Vossen MC, Kusurkar RA, Meeter M, de la Croix A. Doen mijn studenten mee of niet? Een Video-Stimulated Recall studie naar het gedrag van medisch studenten tijdens kleinschalig activerend onderwijs. Onderzoekspaper. NVMO conference 2021.
8. **Grijpma JW**, Mak-van der Vossen MC, Kusurkar RA, Meeter M, de la Croix A. Engaged or disengaged? Using Video-Stimulated Recall to gain insight into medical student behavior during small-group learning activities. Research paper. AMEE conference 2021.
9. **Grijpma JW**, de la Croix A, Kleinveld JH, Meeter M, Kusurkar RA. Actief leren in studiegroepen: wat willen studenten geneeskunde en waarom? Een Q-methodologische studie. Paperpresentatie. ORD 2021.
10. Kusurkar RA, Mak-van der Vossen MC, Kors J, **Grijpma JW**, van der Burgt SME, Koster AS, de la Croix A. Hoe kunnen onderzoekers een persoonsgerichte benadering gebruiken voor onderzoek naar medisch onderwijs. Workshop. NVMO conference 2020.
11. **Grijpma JW**, de la Croix A, Kleinveld JH, Meeter M, Kusurkar RA. Active learning in small groups: what do medical students want, and why? Oral presentation. IAMSE 2020.
12. **Grijpma JW**, de la Croix A, Kleinveld JH, Meeter M, Kusurkar RA. Wat verwachten studenten geneeskunde van hun studiegroep, tutor, en opleiding? Een Q-methodologische studie naar leervoorkeuren. Onderzoekspaper. NVMO conference 2019.
13. **Grijpma JW**, de la Croix A, Kleinveld JH, Meeter M, Kusurkar RA. Patterns of learning preferences: A Q-methodological study into medical student learning. Poster presentation. SDT conference 2019.
14. **Grijpma JW**, de la Croix A, Kleinveld JH, Horrevoets A, Meeter M, Kusurkar RA. Patterns of learning preferences: A Q-methodological study into medical student learning from tutorial groups. Short communication. AMEE conference 2019.
15. **Grijpma JW,** Mak-van der Vossen MC, Kusurkar RA, Meeter M, de la Croix A. Lacking motivation or learning silently? Motivation and participation of medical students in small group learning activities. Poster presentation. SDT conference 2019.
16. **Grijpma JW**, Kusurkar RA, de la Croix A, Berkhout J. Q is good for you: mixed methods in het onderzoek van onderwijs. Workshop. NVMO conference 2018.

Grants, awards, and nominations

Year	Grant/award	Title
2021	Medical Education top downloaded article	Medical student engagement in small-group active learning: a stimulated recall study
2021	AMEE conference research paper award	Engaged or disengaged? Using video-stimulated recall to gain insight into medical student behavior during small-group learning activities
2020	IAMSE conference Oral presentation award (nomination)	Active learning in small groups: what do medical students want, and why?
2018	IAMSE-ScholarRX Educational Research Grant	Student preferences for learning from tutorials: a q-methodological study

Training

Year	Organization	Title
2020	VSNU/SpringerNature/ UB-VU	Research impact training: creating a societal impact strategy
2020	FGB-VU	Writing a data management plan
2019	Taalcentrum-VU	Writing a scientific article
2019	Epigeum	Research integrity course
2018	AMEE	Research essential skills in medical education (RESME)

Other scientific activities

Year	Activity
2023	Master's thesis supervisor for a student of the Faculty of Medicine, Vrije Universiteit Amsterdam
2023	Bachelor's thesis supervisor for a group of students of Educational Sciences, Vrije Universiteit Amsterdam
2021-2024	Coordinator of Journal Club meetings for colleagues at VU-Centre for Teaching & Learning
2021-2024	Methodological advisor for Q-methodological studies within and outside Amsterdam UMC and Vrije Universiteit Amsterdam
2019	Member of the organizing committee for the SDT 2021 conference
2018-2021	Coordinator of Journal Club meetings for PhD students in Medical Education from the Netherlands

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ABOUT THE AUTHOR

Jan Willem Grijpma was born on June 7th 1985 in Franeker, the Netherlands. After completing his pre-university education at RSG Simon Vestdijk in 2003, he enrolled at Leiden University to study psychology. He obtained his master's degree in 2010.

During his studies, Jan Willem developed an interest in teaching and research. Therefore, he completed two internships during his master's: one in teaching and another in research. After graduation, he began his career at the Erasmus University Medical Center in Rotterdam, where his interests in teaching and research converged. He was involved in teaching medical students and conducting research among kidney transplant patients.

In 2015, Jan Willem advanced his career by accepting a position as a teacher trainer at the Vrije Universiteit Amsterdam. In 2018, he seized the opportunity to commence a PhD journey, rekindling his interest in research. He chose to delve into a topic close to his heart: student engagement in active learning. His aim was to support the teachers and other educational professionals he works with more effectively, so that student development may be enhanced.

Presently, Jan Willem continues to conduct faculty development programs, integrating the lessons learned from his PhD in his work. He also continues his research work in Team Research in Education at the Faculty of Medicine, Vrije Universiteit Amsterdam. Lastly, he is involved in developing the Scholarship of Teaching and Learning program at the Centre for Teaching and Learning, Vrije Universiteit Amsterdam.

Jan Willem lives in Hilversum, is happily married to Valérie, and is the proud father of two boys: Victor (2018) and Marcus (2021).