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CHAPTER 5

How personal factors and teaching context affect teachers' conceptions of learning and teaching in student-centred medical education: a qualitative study

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Abstract

Introduction

Previous research has revealed that teachers' conceptions on learning and teaching influence their teaching practices. To obtain more insight into how teaching behaviour can be influenced, we explored these conceptions more in-depth. In an earlier study, we found significant differences between teachers' conceptions in two medical schools with a different tradition in student-centred education. The aim of the present study was to reveal which institutional, departmental and personal characteristics were associated with differences in teachers' conceptions of learning and teaching.

Methods

Individual interviews were conducted with 13 teachers of the undergraduate curriculum in two medical schools. The interviews focused on their perceptions of the teaching environment: medical school, curriculum, department and educational context, and personal factors. We used a template analysis.

Results

Large individual differences existed between teachers. However, common personal factors were 'agency', 'experience with PBL (as a student or a teacher)', 'personal development', 'motivation and work engagement' and 'high content expertise combined with late PBL experience'. The contextual factors included 'leadership style' at all levels, but especially of department chairs, 'affordances and support', 'support and relatedness', and 'students' characteristics'. Factors mentioned at the medical school and curriculum level were 'tradition, curriculum change', 'support by educational department' and 'management and finances'.

Conclusion

We advocate to pay more attention to leadership style courses for department chairs in faculty development, and to teachers' conceptions of learning and teaching.

Introduction

Teaching approaches of teachers affect students' learning approaches and thus students' learning results.¹ Trigwell and co-workers reported that in classes where teachers describe their approach to teaching as transmitting knowledge, students are more likely to report surface learning approaches in students.² In an earlier study, we explored teachers' conceptions of learning and teaching in two student-centred medical curricula using the COLT questionnaire. A cluster analysis resulted in five teacher profiles, ranging from a traditional profile aiming to transmit knowledge to a more modern profile fitting into student-centred education.³ In another study, medical school appeared to be the most important predictor of teachers' conceptions of learning and teaching.⁴ Prosser and Trigwell also demonstrated the impact of teaching environment on teachers and their teaching behaviour.⁵ Moreover, outcomes of faculty development activities are modified by the organizational context, e.g. by competing pressures on teachers, enacted values of the organizations, and the nature of leadership.⁶ Norton et al.⁷ demonstrated that if staff of different institutes had similar beliefs about teaching, 'their intentions for teaching seemed to be a compromise between their conceptions and their academic and social context' (p. 564).

Studies on general higher education identified several elements in the teaching environment which affect teachers' conceptions and approaches. Department chairs appeared to have a substantial influence through their leadership and management style.⁸⁻¹⁰ It was also important how the department chairs handled the tension between research and education.¹¹ The educational climate in departments and organizations appeared to be of influence as well.^{12,13} In general higher education, Bailey empirically demonstrated that the interactions between top management and staff at the departmental level, and the teaching and learning interactions between teachers and students, were influenced in overt but also in subtle and occluded ways which teachers might not be aware of.¹⁴ Important factors were the type of curriculum, the governance of the curriculum, department conflicts of agency and structure, and power relations. Important factors at the personal level were teachers' autonomy and their perceptions of control over what and how to teach.^{5,15} Moreover, teachers' perceptions of the teaching environment were modified by work engagement^{16,17}, and satisfaction and emotions¹⁸.

To our knowledge, no study has investigated the association of all these elements with teachers' conceptions of learning and teaching. In the present study, we aim to explore how institutional, departmental and personal characteristics affect teachers' conceptions of learning and teaching. This might provide a broader perspective on how teaching behaviour can be improved and help identify supportive interventions in addition to the usual faculty development activities. To gain this insight, we conducted individual interviews with teachers.

Our research question was which institutional, departmental and personal characteristics can be identified in relation to differences in teachers' conceptions of learning and teaching.

Methodology

The present study was based on a phenomenological epistemology¹⁹, from a constructivist viewpoint. We explored how individual teachers in two medical schools with student-centred medical education made sense of their experiences. With this micro-level approach, we aimed to elicit which meanings our interviewees attached to their interactions and classifications, instead of attempting to capture one 'true' reality. The constructivist viewpoint refers to 'constructivism', the conception of knowledge that holds that there is no absolute truth shared by all and that 'the reality we perceive is constructed by our social, historical, and individual contexts' (p. 405).²⁰

Methods

Setting

We conducted our study in two Dutch medical schools with student-centred curricula (Maastricht University Medical Centre, Maastricht and VU University Medical Centre, Amsterdam). In one context (Maastricht), there is a long-standing tradition in student-centred medical education ever since the founding of the university 40 years ago.²¹ In the other context (Amsterdam), a student-centred curriculum was introduced in 2005, replacing a classical teacher-centred curriculum. Both institutes have small group learning activities at the core of their curriculum. Both curricula offer integrated courses which are coordinated by a course coordinator. A tutor guides a group of 10 to 12 students for a duration of 20 weeks in Amsterdam, and for six weeks in Maastricht.

Participants

We purposefully sampled teachers from both universities for individual interviews, based on their profiles in conceptions of learning and teaching.³ To obtain maximum contrasts and thus a hypothesized insight into teachers' conceptions of learning and teaching, we sampled the teachers from three of the five teacher profiles: Transmitters (most traditional), and Conceptual Change Agents and Facilitators (both student-centred conceptions), see Table 1. The teachers were also chosen to represent several disciplines and teaching roles.

Data collection

All participants were interviewed by the first researcher (JCGJ) in individual structured interviews (between November 2011 and November 2012), because we expected that individual interviews would provide greater openness than focus group interviews. Each interview lasted approximately one hour. Prior to the interview, the teachers received some background information about our first study on teachers' conceptions of learning and teaching, including the differences we found in teachers' conceptions between the two participating medical schools. Also, two main questions of the interview were given beforehand: "How do you explain the differences in teachers' conceptions of learning and teaching between the two medical schools?" and "How did your conceptions of learning and teaching change during your career?". Afterwards, we asked probing open-ended questions to collect information about the teachers' perceptions of the teaching environment, more specifically about their medical school (macro level), their department and educational context (meso level) and their personal circumstances (micro level). After the first two interviews we evaluated the interview guide, but this did not result in adaptations. (See Appendix: interview guide.)

To create a safe atmosphere, we explicitly did not discuss the teachers' conceptions, we had an indication of their conceptions in advance as they all filled in the COLT previously. The interviews were audiotaped, transcribed verbatim and summarized for member checking. All interviewees gave their consent, and two interviewees added some information. All coding was done using qualitative data analysis software (Atlas-ti, version 7.5.1).

Data analysis

Since we already had an *a priori* indication of which factors would be represented in our data, we analysed the data using template analysis.^{22,23} Therefore, the analysis started with an 'initial template' based on our assumptions, and this template was modified by iteratively

adding, deleting and reorganizing themes as the coding continued. The first researcher (JCGJ) first coded six interviews and changed the template iteratively. Subsequently, the second researcher (SjvL) coded two interviews. Because of large differences in their coding, they discussed the template, modified it and decided to recode all the interviews. With a new template, they coded two interviews together to obtain consensus about the codes. Subsequently, two interviews were coded separately and discussed afterwards. This resulted in consensus. Afterwards JCGJ coded the rest of the nine interviews. Atlas-ti provided a sorting of quotations, which were summarized in themes and discussed with the research team.

Ethical approval/ Confidentiality

The VUmc Ethical Review Committee advised positively on the study. In the invitation for the interview and at the start of the interview, we explicitly stated that participation was voluntary and that full anonymity was guaranteed.

Research team

The daily research team consisted of JCGJ, who is a PhD student, a medical doctor and an educationalist with experience in faculty development, and SjvL, who is a senior staff member trained in medicine and holds a PhD degree in medical education. Both were involved in the implementation of the student-centred curriculum in Amsterdam. Between 2005 and 2008, the first researcher was also involved in faculty development, including the training of teachers for small group education. In the second part of the study, the daily research team was joined by another senior researcher, who was trained in medicine and holds a PhD degree in medical education. The supervising team consisted of one professor of medical education who is also a gynecologist, one professor of medical education who is a medical doctor and program director of an undergraduate curriculum in Medicine, and a professor of medical education who is a psychologist.

Results

Theoretical saturation was reached after 13 interviews. Three teachers declined to participate because of time constraints. We had no indication that the participating teachers differed from the three teachers who declined to participate. The characteristics of the 13 interviewees are presented in Table 1.

Table 1: Descriptives of the participants (N = 13)

Discipline	Basic sciences: 6 Clinical sciences: 7
Age	Range: 31-61, Mean 44.7
Gender	Female: 4
Teacher profile	Transmitters: 5 Conceptual Change Agents: 6 / Facilitators: 2
Medical school	Amsterdam: N = 7, Maastricht: N = 6
Teaching experience	Range: 5 – 35, Mean 14.1

Based on findings in the literature ^{e.g. 5,9,12,14} we chose to categorise our results into personal and contextual factors. The contextual factors were sub-categorised into department, educational context (both meso level) and medical school and curriculum (macro level). See Figure 1. Illustrating quotes from the interviews are presented in Table 2.

Personal factors

There were large differences between teachers. The individual descriptions of their professional development as teacher varied widely. Personal experiences as a student and subsequent choices and experiences in their career resulted in a range of professional identities which combined roles such as teacher, scientist and/or clinician. The descriptions of their conceptions on learning and teaching in the interviews differed as well. We were nevertheless able to extract some common themes.

Agency. The combination of delivering education and coordinating and/or developing courses was perceived as valuable, challenging and interesting. Some teachers with the Transmitter profile explicitly reported agency, saying that they wanted to have a direct influence on the content and the structure of the curriculum.

Experience with PBL (as a student or a teacher). Experience with PBL as a student or as a beginning teacher seemed to be associated with a Conceptual Change Agent profile, but teachers who did not have this experience also developed conceptions fitting this profile.

Personal development. Teachers were positive about the long faculty development trajectories. Some perceived a lack of time to invest in their professional development as teachers. Also, teaching experience influenced personal development. At the start of their

career, teachers found it difficult to adopt a student-centred learning format and to give students the responsibility for learning. As a beginning teacher, their primary concerns were to master the content themselves, to answer all possible questions, to determine the number of slides and to deal with nervousness. With increasing experience, self-confidence and feeling of competence increased.

Motivation and work engagement. In general, all teachers were motivated for teaching. They felt inspired and engaged by the interaction with students, especially if students were enthusiastic and motivated. In small group learning, some tutors perceived a bond with their students. The motivation of teachers for lecturing decreased if students seemed to attend their lectures only for social reasons.

High content expertise combined with late PBL experience. Teachers who were trained in a traditional curriculum and were used to transmitting expert-knowledge for many years found it hard to change their teaching strategies towards conceptual change strategies and corresponding conceptions. These teachers found it difficult to guide students and to only scaffold their learning, without sharing their own content expertise.

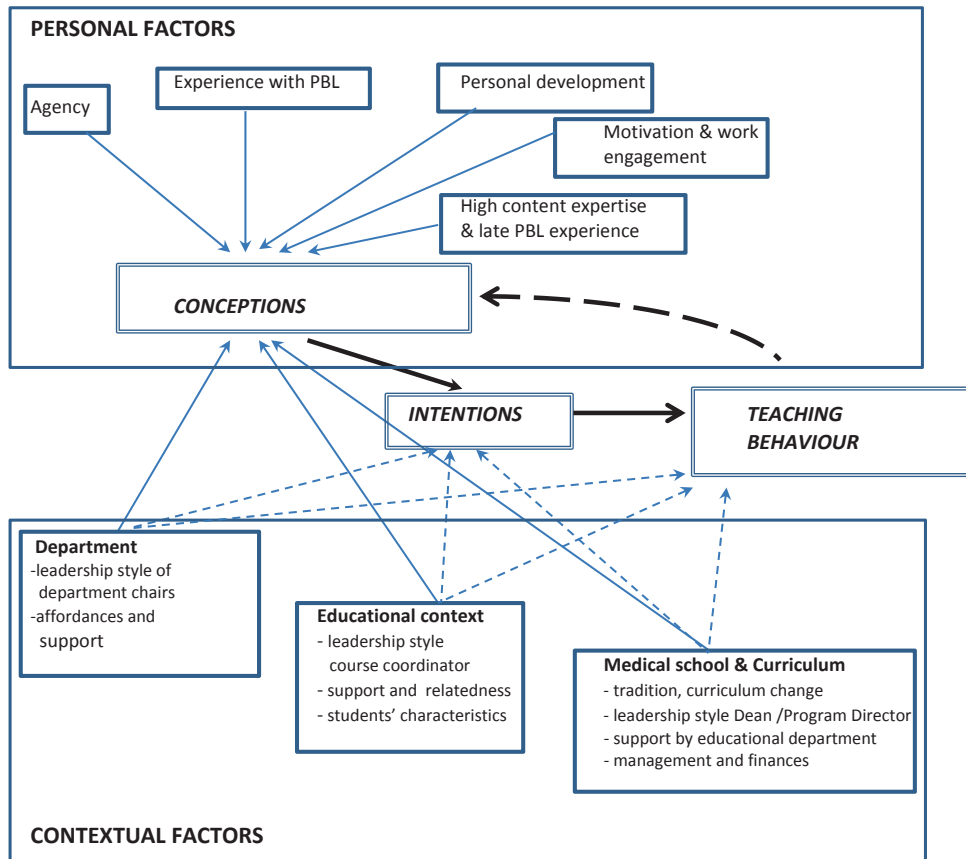
Contextual factors: (1) Department

Leadership style of department chairs. The department chair's view on education appeared to be important. The chairs stimulated or frustrated investments and efforts in education by the teachers in their department. Some department chairs used clear guidelines resulting in clarity for all staff members: e.g. 'everybody in our department participates in education', or 'overall, everybody participates in education for 30% of his job'. In most departments, research and/or patient care were more important than teaching. Educational meetings in a department helped to draw more attention to education.

Affordances and support. Department chairs decided if and when opportunities were afforded to teachers, usually at the annual appraisal. In some departments the options were limited due to financial constraints. Teachers also perceived support from colleagues, mostly focused on the content of the education they delivered. Teachers only incidentally exchanged ideas with colleagues about which teaching approaches they should use, or about their perceived difficulties in the delivery of education. Sometimes they perceived relatedness with their colleagues, which was stimulated by meetings on education.

Figure 1: Influence of personal and contextual factors on teachers' conceptions of learning and teaching and teaching behaviour

This model represents our findings regarding possible relationships between the factors. Central to this model are the teachers' conceptions of learning and teaching, intentions and teaching behaviour.



Contextual factors: (2) Educational context

Leadership style of the course coordinator. The respondents indicated that differences in leadership style of course coordinators resulted in large differences. For example, if a course coordinator inspired students and was respected by them, this positively influenced all the teachers involved in the course. A collaborative leadership style was highly appreciated.

Support and relatedness. In the educational context, teachers collaborated between disciplines, sometimes even more than within disciplines. Relatedness with peer teachers, or the feeling to be connected in a joint effort, was valued more highly than just emotional or practical support.

Students' characteristics. Teachers had two different opinions about students, in line with their teaching profiles. Teachers with the student-centred profiles, Facilitators and Conceptual Change Agents, thought that students were working quite well, and some were impressed with how well students could explain difficult subject matter to peers. Teachers with the Transmitter profile expressed their doubts about the knowledge acquisition by students in a student-centred curriculum. Moreover, teachers reported that students study strategically and try to pass examinations with a minimum effort. Sometimes this results in students' preference for teacher-centred education.

Contextual factors: (3) Medical school and Curriculum

Teachers thought that the conceptions of teachers would have been influenced by the direction set out by the educational department of the medical school in Maastricht during the past 40 years, as well as by the school's longstanding tradition of PBL. Also, it was said that the major curriculum change in Amsterdam required a concomitant change in teachers' conceptions of learning and teaching. It seems reasonable that this change needed time. Teachers expected the dean and director of the medical education program to advocate teaching at the level of the university and the university medical center, and to facilitate it by earmarking finances, personnel, and time.

Some teachers were critical about a directive management style and preferred a more supportive role for the educational department, instead of a leading administrative position. They thought that teachers rather than the educational department should be viewed as 'the owners of the curriculum'. Furthermore, they would like to reduce the tasks and responsibilities of the educational department to practical issues such as grades registration and time tabling. Some teachers in Amsterdam felt restricted in their autonomy to choose what and how to teach, not only by the educational leadership but also by the fixed structure of the student-centred curriculum in comparison with the previous lecture-based curriculum. Finally, in both medical schools the financial rewards provided by the educational department for the delivery of education were an important source of income for many departments.

Table 2: Overview of quotations

(Coding of respondents: M or V indicates medical school (Maastricht or VUmc Amsterdam); subsequent number (1 to 7) refers to number of interviewee in respective medical school; T = Transmitter profile, F = Facilitator profile, CCA = Conceptual Change Agent profile)

Personal factors	
Agency	'if I only were a tutor in various courses, so if I had to fill my educational load that way, that would seriously reduce my motivation, I wouldn't like that. I really... eh... like having an influence on the content or the composition of a course.' (M-1 = T)
Experience with PBL (as student or teacher)	<p>'I studied in X, a traditional lecture-based, teacher-centred curriculum, so when I started working in Maastricht, that was completely new for me. And when I started to teach it became clear that I didn't dare to give much freedom to the students, in the beginning.' (V-5=CC)</p> <p><i>(Teacher with PBL experience in Maastricht as a student, now teaching in Amsterdam)</i></p> <p>'I think – but all right, that is my personal impression, based on what I see here (Amsterdam) and what I have seen there (Maastricht), - ..that the approach is a bit more directive here. Therefore, I think that it will easily result in a more teacher-centred way of working. Based mainly on the study assignments and the kind of topics students work on here.' (V-2=CC)</p>
Personal development	<p>'...because traditionally university teachers are hardly trained in didactics; it is taken for granted that our expertise automatically equips us to teach well' (V-6=T)</p> <p>'In the beginning I was only focused on my slides and ' hey, how am I doing?' Do you know what I mean? And now I think, okay, what are the teaching goals, what do I want my students to learn? How am I going to do it? How can I arrange this in such a way that they are going to engage with the study material? That is what you have to learn as a teacher. (V-2=CC)</p>
Motivation and work engagement	<p>'I think - you're obliged to transmit the knowledge you gathered– uh – during your studies and ... your working experience... to pass all that on to ... say...younger colleagues. That...that is just an intrinsic..., eh yes, that is part of the job.' (M-4=T)</p> <p>'Uh, an important motivation for me is the interaction with the students, ... students who are also motivated themselves..' (V-6=T)</p> <p>'Through the interaction.... That is my as a tutor,for example I ask them something... then using their answers I ask them another question, and then you see them think hard, and finally and that is what I also like very much, is to see them come up with the answer themselves.' (V-7=F)</p>
High content expertise combined with late PBL experience	<p>'I think - you're obliged to transmit the knowledge you gathered– uh – during your studies and ... your working experience... to pass all that on to ... say...younger colleagues. That...that is just an intrinsic..., eh yes, that is part of the job.' (M-4=T)</p> <p>'Personally I prefer the traditional education, ... in some instances it might be good to give the initiative to the student, but students have to be guided.. uh, by teachers who are experts in their domain'' (V-6=T)</p>

Contextual factors: (1) Department

Leadership style of department chairs

'Department chairs who are completely dedicated to education, yes..., that is not always possible of course, but it is extremely important to involve and engage the other members of the department. Yes, it is very important actually. In fact, I am not sure whether people are sufficiently aware of this. (V-2=CC)

'Yes, that is being discussed. The department chairs asks.. do you want to.... we have to indicate in advance whether we are interested to become a tutor in small group learning. It is also discussed during the annual appraisal, what are your aspirations, what else would you like to do, are you content, what would you like to change etcetera, so there really is room to discuss these things and you can also indicate your preferences. ' (V-3=CC)

'In our department it is not as straightforward as that, because by providing education ... for our department, education is an important reason for its existence So, providing education is in fact appreciated, but besides that e it is of course also appreciated very much if I have a good scientific output.' (V-6=T)

Affordances and support

'(about department chairs)... they decide if time is allowed to staff members for teaching. They decide who may follow a course ... or whether someone gets the opportunity to distinguish himself.'(V-2=CC)

'If I know that one of my colleagues developed a course on lungs and I am to give ...uh... a lecture on that part of the lungs, of course I contact him and discuss what he did, so I can elaborate on that....' (M-1=T)

'Yes, that is what I do myself as well with – colleagues, but it depends on the type of education, if I start something, or if I develop a new seminar approach, then I try to sound out colleagues who have more experience in education to see if they think my ideas will work out or not.'(V-6=T)

Contextual factors: (2) Educational context

Leadership style

'And I also see it is related to A. I observe that students have incredibly much respect for A, that's what I feel, and that positively influences the whole semester. So we profit from it as well, and that's ideal for us as teachers. '(V-2=CC)

'I do not actually feel that I am am being told what to do by B..... as course coordinators we try, together with a group of other people who advise us, to develop a certain view on education which on the one hand is not restrictive but on the other hand does not lead to chaos.'(V-4=F)

'I do not find it helpful if a semester coordinator has never been a course coordinator himself... it's just like when you are in command of a group, uh, you have to have experienced it yourself, I think, to be aware of the difficulties which come up....so you can imagine what it means to be a course coordinator. (V-4=F)

Support and relatedness	<p>‘(during the course...) we have a daily coaching session from ten thirty to eleven o’clock in the morning. During these sessions we discuss the entire course program of that week, you know, including for example.... How did the lecture on heart failure go....’ (M-4=T)</p> <p>‘At the end of X we have an evaluation as well, when we look back on the course, what went well, what did not go well and what should be improved, what problems emerged, etcetera.’ (M-3=CC)</p> <p>‘.. In teamwork, so that you don’t feel that you are on your own. I mean the peer teachers, as well as the semester coordinator, and the Educational Department. That there is a team spirit, the sense that we are going to achieve this together.’ (V-2=CC)</p>
Students’ characteristics	<p>‘And that students dare to admit.., well ...actually I don’t understand this, can you explain it once again? Some students are really great at explaining, they explain things very well, briefly and concisely, without using difficult expressions.’ (V-3=CC)</p> <p>‘However, there are some students that give us the impression that they understand it all, they also work well, methodically including pathophysiology and analysis and differential diagnosis, ... whereas other students –and that is difficult to assess during the course, I think -, other students give the impression that it often... - that they missed certain connections, and that they only understood bits and pieces.’ (M-4=T)</p> <p>‘Well, I do notice sometimes that students are very keen to know the right answer, for example on the electronic Discussion Board. But this changes every year.’ (V-2=CC)</p>

Contextual factors: (3) Medical School / Curriculum

Tradition; Leadership style Dean / Program Director	<p>‘From the beginning there have been discussions with all teachers and students about our view on education, and how best to promote that view’ (M-6=CC)</p>
Major curriculum change	<p>‘... and the problem-based learning, small group education with tutors has only been here in Amsterdam for six or seven years, and uh, of course a certain shift in teaching culture cannot be achieved in six or seven years in the complete teaching staff’ (V-7=F)</p> <p>‘I now have to, you know, deliver, I have to talk about this specific topic because it is the central topic in this particular week, and that is, I did not have to do that in the past. And because I almost always invite patients for my lectures, I almost never lecture without patients, ..so of course I have to work with the patients who are available. It takes a lot of extra effort to arrange all that, and it makes it all less spontaneous.’ (V-4=F)</p>

Support educational department	<p>‘For many things you don’t need the support of the Educational Department, in case of a lecture for example, or other parts of a course. But for the construction and logistics of a complete course, and uh... computers, time tables, and the analyses of examinations, all that is supported by the Educational Department..’(M-1=T)</p> <p>‘but of course, that will be taken care of by the Educational Department, ...our own department facilitates everything for us....and I think there won’t be any problems on that level – or might be....they are very accessible, also in case of problems ...’ (M-3=CC)</p>
Management and finances	<p>‘But also we have to tutor small group learning, for example, ...that is very, very, veryuh, we really have to do that because of the financial rewards for our department’ (V-7=F)</p>

Discussion and Conclusions

This study investigated the personal and contextual factors (institutional, departmental and educational contexts) that might be associated with teachers’ conceptions of learning and teaching. The interviews identified factors which enhanced or reduced the likelihood that teachers developed student-centred conceptions, or teacher-centred conceptions.

Besides large individual differences between teachers, we also found some common themes between departments, educational contexts and medical schools on the one hand, and teachers’ conceptions of learning and teaching on the other hand. Leadership style appeared to be particularly important, for department chairs, but also in the educational context and medical school. We will discuss our findings from the perspective of the individual teacher (personal factors) and from the contextual factors (departments, educational context, medical school), split into general findings and findings related to the differences in teacher profiles.

1A. Personal factors - general findings

Agency by involvement in educational management and development appeared to be important for teachers, though the motivation differed between the teacher profiles. We assume that if teachers are more involved in a discourse about learning and teaching, they might be more inspired and challenged, and may possibly change their conceptions on learning and teaching. However, although less plausible, the relation might also be reciprocal: teachers with student-centred conceptions on learning and teaching might participate more in other educational fields.

Experience with PBL as a student or as a beginning teacher was associated with conceptions of learning and teaching. In our sample, two teachers had experienced PBL as students, and one teacher started his teaching career in a PBL curriculum. These three teachers had a Conceptual Change Agents profile. They experienced the student-centred approach themselves and naturally developed a student-centred repertoire as teachers. This is in line with Bernstein et al.²⁴ and Maxwell and Wilkerson²⁵, who reported that direct experience with problem-based learning resulted in more positive opinions about PBL among students and teachers.

Motivation and work engagement were high for all teachers and were mainly related to the interaction with students. Therefore we hypothesize that motivation and work engagement influence not only teaching behaviour, but also teachers' conceptions of learning and teaching. Applying the Self-Determination Theory for teachers, intrinsic motivation is dependent on fulfillment of feelings of teachers' autonomy, competence and relatedness.^{26,27} These were frequently reported in our study. Van den Berg et al. (2013) found that teachers reported the following as the most motivating elements for teaching: teaching about their own speciality, noticeable appreciation for teaching by their direct superior, teaching small groups, feedback on their teaching performance, and freedom to determine what to teach.¹⁶

High content expertise combined with late PBL experience seemed to be associated with a Transmitter profile. These teachers believe that the content expertise they developed over the years is so complicated that students' learning would be optimal only if their knowledge is transmitted to students. If these high teacher-centred conceptions are combined with late experience in PBL teaching formats, the teachers' appreciation of active learning will be low. An attempt to influence and change these conceptions could be to challenge the teachers by exposure to a student-centred teaching format.

1B. Personal factors - Differences between teacher profiles

The reasons for obtaining agency differed. Teachers with the Transmitter profile wanted to exert control on the curriculum, while the profiles Facilitator and Conceptual Change Agents seemed to have a more intrinsic interest in the management and development of education. In a previous quantitative study we found that involvement in more educational fields besides the delivery of education was found more often in the profiles Facilitators and Conceptual Change Agents.³ With respect to their background, three teachers with

a Conceptual Change Agents profile had experienced PBL as a student or as a beginning teacher. Teachers with high content expertise combined with late PBL experience seemed to have more often a Transmitter profile.

2A. Contextual factors (departments, educational context, medical school) - general findings

Leadership appeared to be very important for teachers' conceptions of learning and teaching, at all levels. Although the impact of the leadership style of department chairs has been reported before by some authors ^{e.g. 8,9,11}, it is still undervalued in medical education. Silver argued that a university does not have a single organizational culture, and he described disciplines and departments as rather autonomous units.¹² In medical education, faculty development increasingly invests in leadership training²⁸, but these efforts are mainly offered to program directors or curriculum coordinators, and often neglect department chairs. Recently, Lief and co-workers investigated the needs of department chairs within a faculty of medicine.²⁹ The needs included a cultural and structural awareness of the organization (e.g. social norms and values), a comprehensive network of support, but also interpersonal skills (such as valuing others, conflict management, effective communication), or the ability to influence (power, engaging others).

Further, we agree with Dhaliwal and Sehgal that 'leadership suffers from a branding problem among trainees, who often equate it with official positions of authority'(p. 1441).³⁰ There are more leaders in medical education than just a program director or a division chief, and they can all inspire action and change.

Many interviewees mentioned the long-standing tradition of PBL in Maastricht as an explanation why teachers' conceptions differed from those in Amsterdam. To establish a concomitant shift in teachers' conceptions of learning and teaching after a major curriculum shift probably requires a lot of time. Four years after the curriculum shift in the medical school in Amsterdam, we found a substantial number (38.0%) of teachers with a preference for lecture-based teaching. In Maastricht, this percentage was 21.4%.³

Surprisingly, despite all the attempts to provide student-centred education, some teachers reported in the interviews that students have a preference for teacher-centred education, which is in line with the findings DaRosa et al. reported before.³¹ This preference is probably caused by the students' desire to study strategically and to pass examinations with a minimum of effort.³²

2B. Contextual factors - Difference between teacher profiles

The teacher profiles differed in their opinions about students' learning processes and knowledge. Teachers with the profiles Facilitators and Conceptual Change Agents thought that students were studying quite well in the student-centred curriculum. Teachers with the Transmitter profile expressed doubts on the knowledge acquisition of students in a student-centred curriculum.

Understanding teachers' conceptions and actual teaching behaviour: a framework

We have discussed how institutional, departmental, curricular and personal characteristics are related to teachers' conceptions of learning and teaching. However, we are ultimately interested in teachers' behaviour, what they *actually do* in teaching practice (approaches to teaching or teaching strategies) or what they *intend to do* (teachers' intentions). From previous studies we know that teachers' conceptions of learning and teaching and their intentions are not always in line with the actual behaviour.^{7,33}

To obtain more clarity regarding teachers' behaviour, we propose a framework describing the relation between conceptions and teaching behaviour. In Figure 1 we present a framework describing our context of teaching behaviour, teachers' conceptions of learning and teaching, and personal and contextual factors. One box (above) presents all the personal factors mentioned in the interviews which affect teachers' conceptions of learning and teaching. Subsequently, the middle of the figure indicates how teachers' conceptions influence their intentions for teaching, and finally, their teaching behaviour. The second box (below) shows the contextual factors (subdivided into meso and macro level), which influence not only teachers' conceptions of learning and teaching, but also possibly teachers' intentions on how to teach and the strategies they apply in their teaching behaviour.

We hypothesize that this framework might be a starting point to gain a better understanding of the complexity of teaching behaviour, the interplay between several personal and contextual factors, and the results of faculty development activities. It may illustrate that workshops and seminars addressing teaching skills are not the only appropriate initiative to obtain sustainable results in a change of teachers' behaviour, but that simultaneous interventions addressing other factors in the framework are needed as well. However, future research is needed to study this framework and to assess the relationships between its elements. Possibly the framework can guide future initiatives, both on the personal and

the contextual level, to improve teaching behaviour in order to eventually improve the learning outcomes of our students.

Strengths and Limitations

We think it is a strength of our study that we purposefully sampled the teachers, in order to obtain maximum contrasts. We compared teachers with differing teaching profiles, traditional Transmitters profile versus student-centred profiles (Conceptual Change Agents and Facilitators). Another strength is that all the interviews were conducted by one interviewer and that the analysis was performed in collaboration with a second researcher, based on a template analysis. Moreover, our study yielded interesting results, e.g. on the impact of department heads and the impact of involving teachers in various educational fields. Finally, we think that we were able to contribute to a theoretical approach on the relation between personal and contextual elements influencing teachers' conceptions, intentions and teaching behaviour.

It might be a limitation that teachers with other profiles were not included in our study. Also, a bias might have occurred, because the interviewees filled out the COLT questionnaire before. The cross-sectional design of this study could also be a limitation. A longitudinal approach might probably have been better, for example with repeated interviews and repeated measures with the COLT questionnaire in a one-year faculty development trajectory. Since the study was performed in two medical schools in the Netherlands, the generalizability of our findings has to be assessed in a follow-up study.

Suggestions for future research

We suggest future investigations to confirm, modify or reject our hypothesized framework, perhaps in a quantitative study using structural equation modelling. A longitudinal design study with repeated measurements of teachers' conceptions and teaching behaviour would be interesting, to monitor the effects of longitudinal faculty development trajectories. Another suggestion is to explore the effects of a leadership training course for heads of departments, in relation to teachers' conceptions of learning and teaching and teaching behaviour. Finally, we recommend further research on the interplay between teachers' conceptions and teachers' motivation, related to autonomy, competence and relatedness, from the perspective of the Self-Determination Theory.

Implications for practice

First, our results underlined the importance of contextual factors, especially department chairs and educational cultures in departments. Therefore we recommend to ensure an adequate selection procedure for the appointment of department chairs, followed by leadership training aimed at transformative leadership. Secondly, in a curricular reform, ample time has to be invested in the change process³⁴ and the involvement of teachers should be ensured, as changes are realized at the micro level³⁵ and take more time than is usually estimated. This holds true especially for the replacement of a traditional lecture-based curriculum by a student-centred curriculum. Finally, we advise to involve teachers in educational research, management, and/or development, because this might stimulate teachers to change their conceptions of learning and teaching.

Appendix - Interview guide

Main questions

- Q1:** How do you explain the difference in teachers' conceptions of learning and teaching between the two medical schools?
- Q2:** How did your conceptions of learning and teaching change during your teaching career?
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Probing questions

- Which subject do you teach? How long? (in this medical school or elsewhere?)
What type of task in education? Also research and/or patient care?
Acquainted with student-centred learning, before start as teacher?
Preparation for teaching?
Was the PBL curriculum part of the motivation to apply for a job here?
- About the curriculum General opinion on your curriculum?
How do you value the integration of disciplines?
Or competency-based education?
- Students Can you estimate what students know?
Do students appreciate it when you explain difficult material?
- Appreciation of education in medical school (macro level) What is your opinion about the appreciation of education in your medical school?
- In your department (meso level) Opinion about leadership style of department head?
Are tenure tracks in education possible?
Support or relatedness of colleagues, regarding education?
Are there regular meetings dedicated to education?
Are all colleagues involved in education?
Do teachers have a choice in type of education they offer?
- In educational context (meso level) What is your opinion about the leadership of the (course) coordinator?
- Personal questions Autonomy?
Involvement in education: type? hrs?
Feasibility?
- Support by Education Dept. What is your opinion about the support provided by the Educational Department?
- Age What is your age?
- Efficacy and capability as a teacher (yes-no statements) I think.. that I have the required skills to teach this course;
...that students will learn from me in this course;
...that I mastered the knowledge needed for this course
- Are you motivated for your educational activities? What influences your motivation?
- Are your colleagues in general enthusiastic about education? What influences your colleagues' enthusiasm?
- How do you perceive the contact with students? Stimulating?

What is your opinion about small group learning? About coaching students?
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