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Jacobs, J.C.G.

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CHAPTER 6

General Discussion

This thesis started with a description of current faculty development initiatives and transfer, and explored teachers' conceptions of learning and teaching. Related terms were described, such as beliefs, intentions, approaches to teaching, perspectives, and teaching behaviour. Next, the characteristics of student-centred curricula were presented, followed by a discussion of the relation between faculty development and teachers' conceptions in the context of student-centred curricula. This led to the central research question "How do teachers' conceptions of learning and teaching explain teaching behaviour in a student-centred curriculum?". From this central question, three research questions were derived: [1] can teachers' conceptions of learning and teaching be measured?, [2] which patterns of conceptions can be determined?, and [3] what factors influence conceptions of learning and teaching, and what are the mechanisms?

In this chapter the answers to these research questions are presented and discussed, along with the integration of the findings from all studies in order to come to a deeper understanding of the topic. The chapter concludes with the strengths and limitations of our research projects followed by recommendations for future practice and future research.

To answer the first research question, "can teachers' conceptions of learning and teaching be measured?", we applied the COLT questionnaire, which proved to be very well suited to measure teachers' conceptions of learning and teaching in student-centred education. The questionnaire consists of three scales, 'teacher centredness', 'appreciation of active learning' and 'orientation to professional practice'. The last two scales are new for student-centred education.

The research studies were conducted in two medical schools with different traditions in student-centred education, VU University Medical Centre in Amsterdam, and Maastricht University Medical Centre, Maastricht (the Netherlands). The COLT revealed that teachers in Maastricht had significant less teacher-centred conceptions, a higher 'appreciation of active learning' and a higher 'orientation to professional practice' than teachers in Amsterdam.¹

In addressing the second research question, "which patterns of conceptions can be determined?" chapter 3 concluded that the most important predictor for all three scales was 'medical school'. Discipline, gender and teaching experience explained some variance in two scales. However, more than 80% of the variance could not be explained by these

variables. This contradicts the literature in this field on higher education, as our study did not confirm the predictive value of some variables reported before (teaching practice, hours spent on educational tasks).²⁻⁸ Possibly, the variance between teachers within one institute may exceed the variance between institutes. Or, the variance in teachers' conceptions might be predicted by variables not included in this study, e.g. work engagement, perception of the teaching context, teacher motivation.⁹

As for the teachers, chapter 4 presented five teacher profiles based on a cluster analysis: 'Transmitters' (most traditional), 'Organizers', 'Intermediates', 'Facilitators' and 'Conceptual Change Agents' (most modern). Teachers with the profile 'Transmitters' showed a preference for teacher-centred education and a low appreciation of active learning, while 'Facilitators' and 'Conceptual Change Agents' preferred student-centred education formats. It was hypothesized that there is a development in teachers' conceptions from 'Transmitters' to 'Conceptual Change Agents', as was also suggested by Calkins et al.¹⁰ and by Postareff et al.¹¹. Further research is needed to confirm this hypothesis.

Chapter 5 addressed the third question, "What factors influence conceptions of learning and teaching, and what are the mechanisms?". Large personal differences were found between teachers with respect to their conceptions of learning and teaching, their personal characteristics and teaching contexts. However, there were some common themes, which could be combined in a preliminary model to demonstrate how these factors affected conceptions, intentions and teaching behaviour.

Individual teachers

The findings of our research studies shed some light on teachers' conceptions of learning and teaching in student-centred curricula in Medicine. The interviews demonstrated that there were large differences between teachers regarding their individual experiences, different career paths and personal characteristics. The multiple regression study (Chapter 3) showed that some variance on two COLT scales was explained by the personal factors discipline, gender and teaching experience. Next to these elements, the interviews revealed the impact of agency, experience with PBL as a student or novice teacher, personal development, motivation and work engagement, and the effect of high expert-knowledge combined with late PBL experience. Agency was also reported by Bailey¹² as an important motivating factor for individual teachers. As for experience as a novice teacher, both Bernstein et al.¹³ and

Maxwell and Wilkerson¹⁴ reported that direct experience with problem-based learning resulted in more positive opinions about PBL among students and teachers. With respect to teacher motivation, the Self-Determination Theory pointed out that intrinsic motivation depends on a teacher's experience of autonomy, competence and relatedness.^{15,16} Furthermore, Schaufeli and Bakker¹⁷ as well as Van den Berg and co-authors¹⁸ found that the following five elements were important in motivation 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. It would be interesting to connect the findings on teachers' conceptions of learning and teaching with further research on teacher motivation and work engagement, for example in a longitudinal study in a mixed method approach.

Medical school

When the COLT scores of teachers' conceptions were aggregated to the school level, the scores differed significantly *between* the two medical schools. Moreover, 'medical school' was the most important predictor of teachers' conceptions of learning and teaching. The cluster analysis demonstrated striking differences in the distribution of teacher profiles in the two medical schools. The medical school with the longest tradition in student-centred education had significantly more teachers with the Conceptual Change Agent profile than the other medical school. This effect can be explained in several ways. A first and logical explanation might be the longer exposure to student-centred education in Maastricht (since 1974) compared to VUmc Amsterdam (since 2005), but other institutional factors might be responsible as well. Another explanation might be that teachers who did not want to engage in student-centred education, opted out of teaching or went elsewhere. However, this explanation was not confirmed in the interviews.

Other important factors that became evident in the interviews were the leadership style of the dean and program director, the support provided by the educational department, the management style in the medical school, and finances. An unexpected result of the interviews was the substantial impact of the departments and particularly of the leadership style of department chairs.¹⁹

Departments

Department chairs appeared to have a substantial influence on teachers' conceptions of learning and teaching due to their leadership and management style. Our results indicated that there were substantial differences in leadership and management style between the departments in each of the two medical schools studied. Other relevant characteristics at the departmental level were affordances and perceived support from colleagues and heads of departments. These findings seem in line with Silver, who argued that a university does not have only one organizational culture and described disciplines and departments as fairly autonomous parts.²⁰ Some authors already mentioned the impact of department chairs before.^{4,10,12,21,22} Bailey demonstrated the importance not only of curriculum type and curriculum governance but also of departmental conflicts of agency and structure and of power relations.¹² These elements not only affected interactions between staff at the departmental level, but also the teaching and learning interactions with students. In combination, these elements result in different educational climates in different departments.^{20,23}

We believe that the impact of department chairs and their leadership style on medical education is still undervalued, despite increasing faculty development investments in leadership style training.²⁴ Usually, department chairs do not focus on leadership style training, because "leadership suffers from a branding problem among trainees, who often equate it with official positions of authority" (p. 1441).²⁵ However, Lieff et al. investigated the intricate needs of department chairs within a faculty of medicine and found that these needs included a cultural and structural awareness of the organization (e.g. social norms and values) and 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).²⁶

Besides the departmental context, the educational context appeared to be important for some of the teachers. These teachers attached great importance to leadership by a course coordinator, as well as to support from and relatedness with peer teachers or course coordinators, and to students' characteristics. Although the educational context is related to the curriculum structure and to governance, it may vary in several courses.

To conclude, the differences between individual teachers and their conceptions of learning and teaching were considerable. A more specific focus revealed the impact of departments and department chairs. As substantial differences were found between the two medical schools, this might imply that on top of the departmental differences, there was an overarching effect of the variable medical school. Apparently, the differences between the two medical schools studied in this thesis affect their departments and their individual teachers' conceptions of learning and teaching.

Strengths and limitations

The strengths of this thesis lie in its relevance for faculty development in medicine, its setting in student-centred education, the opportunity to compare two medical schools with different traditions in student-centred education, and the diversity of the methods used.

The first strength is that differences in conceptions of learning and teaching are not only explored at a group level and at the level of individual teachers, but the thesis also tries to determine the mechanisms. In a preliminary model the relation is described between teachers' conceptions of learning and teaching, personal factors, contextual factors, and teaching behaviour. This resulted in recommendations for practice and for further research.

The second strength is that our studies are situated in student-centred curricula. As the role of teachers in these curricula is quite different from the role of traditional lecturers, it seems useful to critically review the corresponding faculty development initiatives. Furthermore, since student-centred curricula in Medicine are gaining ground worldwide, there is a clear need for studies on faculty development in this context.

The third strength of our research projects results from the unique opportunity we had to compare two medical schools with different traditions in student-centred education. One medical school started with a PBL curriculum at its foundation in 1974, while the other school implemented a student-centred curriculum in 2005, replacing a traditional lecture-based curriculum. The experiences of teachers in the latter situation are particularly relevant for schools that will have to undergo a similar change if they choose to implement a student-centred curriculum.

The fourth strength of this thesis lies in the diversity of quantitative and qualitative methods that were used, to address the three research questions. Several strategies were deployed to construct a valid and reliable instrument for measuring teachers' conceptions of learning and teaching. Various stakeholders contributed to this process, and several studies were subsequently performed with this instrument.

A limitation of this thesis is that all our studies were performed in two medical schools in the Netherlands, which limits the generalizability of our empirical results. Therefore our findings need to be interpreted with some caution, and it is advisable to test the generalizability of our findings in follow-up research. A further limitation is that several biases might have affected our findings. One bias might be caused by the fact that the studies described in chapter 2, 3 and 4 were based on one single dataset, which was collected during one large-scale electronic survey in the two medical schools. Nevertheless, as the scope and the methods used were different they resulted in sound and interesting results. Another bias might be indicated by the fact that the validation results of the cluster analysis in chapter 4 resulted in small kappa's. This requires a follow-up study with more participants in a cluster analysis. In chapter 5, the interpretation of the interviews might have been subject to interpretation bias, due to the researchers' knowledge of preceding studies. This limitation was addressed by the authors by paying extra attention to reflexivity.

Another limitation is that our studies did not include observations of teaching behaviour or student evaluations of teaching behaviour. Yet, in our opinion, the findings of the research projects in this thesis provide a sound starting point for follow-up studies in which the subject of teaching behaviour may be included.

The strengths and limitations inherent to the methods and designs of the various studies are also discussed in the individual chapters.

Practical implications

Although further research is recommended to build on the preliminary model presented in chapter 5, the actual model might provide a rationale for a change in faculty development initiatives. It would be desirable to adopt a more customized approach based on teachers' conceptions of learning and teaching. Taking this model into account, faculty development

should focus more on the personal and contextual processes that determine teachers' teaching behaviour instead of merely focusing on training teaching skills. Previous research described the impact of teachers' conceptions on their teaching intentions, approaches and teaching behaviour.²⁷⁻²⁹ The next four steps elaborate on this impact and present some possible recommendations for faculty development.

Step 1: Pay attention to a teacher's profile

If a teacher's behaviour needs to be changed, we recommend taking the teacher's profile (based on his conceptions of learning and teaching) into account. If conceptions and teaching approaches are coherent, Postareff and co-workers speak of 'consonance', and if not, they speak of 'dissonance'.³⁰ Consonance is associated with increased deep learning of students.³¹ In student-centred education, it might therefore be beneficial to support the transition of a teacher's conceptions and corresponding profile towards a Conceptual Change Agents profile, or even to select teachers because they already have the required conceptions and profile.

However, the goal of these efforts should not be to assemble a homogeneous staff of teachers who all have similar conceptions. A certain diversity in teacher profiles will contribute to an inspiring learning environment for students, in particular since students have different learning styles.³²⁻³⁴ Next to teachers' conceptions of learning and teaching, other qualities of teachers are also important to challenge students and to stimulate deep learning. Examples include the engagement of teachers in their work and the ability to inspire and motivate students. Besides that, deep learning is also stimulated by curriculum characteristics, such as early patient contacts.

To facilitate the use of teacher profiles in faculty development, a web-based version of the COLT (<http://colt.vumc.nl>) has been introduced in 2014. Teachers who fill in the questionnaire receive instant feedback by email about their conceptions and corresponding teaching profile, including a comparison with scores of peers. Teachers may use this feedback in several ways in faculty development activities: they may include it in a portfolio aimed at a teacher qualification, as an assignment preceding a faculty development activity, in mentoring²⁴ or in a community of practice³⁵. The feedback can also stimulate discussions among teachers, which in turn may eventually change teachers' partly unconscious conceptions of learning and teaching. If it stimulates critical reflection, it might contribute to the further professional development of teachers.^{8,11,36}

Step 2: Pay attention to personal factors

Next, we recommend paying attention to teachers' relevant personal factors, which were explored in the interview study and presented in the model in chapter 5. These factors are agency, experience with PBL, personal development, motivation and work engagement, and high content expertise combined with late PBL experience. If a teacher, for instance, would like to have more agency in education, this can lead to a change in his conceptions on education. Another example is early experience with PBL: if a young teacher is enabled to work in a student-centred education at the beginning of his career, this might have a decisive influence on his views on active learning.

Ideally, individual interviews preceding faculty development can be helpful in exploring these personal factors, preferably combined with an individual needs assessment aimed at faculty development.

Step 3: Pay attention to contextual factors

It is also of vital importance to focus on the contextual factors which influence conceptions. These factors are also presented in the model of chapter 5. Department chairs and their leadership style are particularly important factors. In line with Knight and Trowler⁴, Norton et al.⁵, Calkins et al.¹⁰, Bailey¹², and Ramsden et al.²¹, heads of departments should be aware of the impact of their leadership style on teachers' conceptions of learning and teaching and on their teaching practices. It remains to be investigated whether improved procedures for the selection of department chairs might have a positive effect. Besides leadership style, critical factors at the departmental level are affordances and perceived support. In the educational context, contextual factors were the leadership styles of course coordinators, support and relatedness with other teachers or course coordinators, and students' characteristics.

As for the medical school and its curriculum, important factors appeared to be tradition and/or curriculum change, leadership style of the dean/program director, support from the educational department, and issues related to management and finances.

Some of these contextual factors may be influenced, for instance, by leadership style courses or by stimulating colleagues to support each other in communities of practice. This implies a broadening of the scope of faculty development towards organizational development and HRM activities.

Step 4: Choose the most appropriate faculty development activities

In this step, we return to the model of Steinert²⁴ presented in the General Introduction (see figure 1), which can assist in the choice of the most appropriate faculty development activity. Individual or group activity, formal or informal, or mentoring? From the perspective of teachers' conceptions of learning and teaching, reflection on a teacher's conceptions is the starting point for all these faculty development activities. In an individual activity like mentorship, insight into a teacher's conceptions will not only stimulate reflection by the mentee, but might optimize the choice of a mentor. It may also be helpful in identifying the topics that need to be addressed in the process of mentoring. In formal group activities, such as workshops or seminars, insight into the participants' conceptions helps to accommodate customized faculty development, and provides the opportunity to form heterogeneous or homogeneous groups of teachers. Reflection on conceptions is also valuable in informal faculty development activities such as learning by observing or by doing, or in communities of practice.

Previous studies have shown that long-term trajectories are effective in changing teachers' conceptions and teaching approaches.^{7,10,11,29,37,38} Further research is needed to determine if the COLT can be used to measure changes in teachers' conceptions over time. Some studies reported that a change in a teacher's conceptions was induced by a teaching experience in a new and challenging teaching context, often in dissonance with the teacher's conceptions. Devlin³⁹ and Guskey⁴⁰ see these new teaching experiences as the most powerful way to influence conceptions.

In the following paragraphs, we will discuss the implications of our findings in relation to teaching behaviour, organizational perspective and curriculum change to student-centred curriculum.

Teaching behaviour

Previous studies have indicated that teachers' conceptions of learning and teaching and their intentions are not always in line with their teaching behaviour.^{5,41} This discrepancy might be explained by personal and contextual variables. A personal variable might be an inadequate reflection on one's own teaching behaviour; for example if the teacher erroneously assumes that he provides student-centred education. On the other hand, a certain teaching behaviour might be enforced by a certain teaching context, while the conceptions of learning and

teaching remain unchanged. For example, a teacher with student-centred conceptions, might give a lecture to 300 first year students and give guidance to twelve third-year students in a small group on the same day, without changing his conceptions.^{3,6,11}

Organizational perspective

As mentioned before, a focus on teachers' conceptions of learning and teaching does not imply that all the staff in a student-centred curriculum should have the same conceptions of learning and teaching and the same teaching profiles. Also, the impact of institutions and curricula on teachers' conceptions should be acknowledged, as was demonstrated in our study in chapter 5 and in previous studies.^{3,42,43} Therefore, an anonymous organization-wide overview of teacher profiles might provide relevant feedback to the dean, the programme director, department chairs and administrators. This may particularly be useful in a transition to a student-centred curriculum. During such a transition, additional information about the organizational 'readiness to change' would also be very informative.⁴⁴ Useful instruments might be the MORC-survey (Medical school's Organizational Readiness for Change; 53 items)⁴⁴, or the Competing Values Survey (16 items)⁴⁵.

Curriculum change to student-centred curriculum

Faculty development may be important during a curriculum change. To assist faculty developers in their choices regarding implementation strategies and investments, a broad overview of teacher profiles might be useful. Curricular innovation programmes often pay too little attention to the pivotal role of teachers and their conceptions of learning and teaching. Although our results underline the importance of exposure to student-centred education and the time needed to change conceptions, other interventions can be identified that have the potential to change teachers' conceptions. They are highlighted above in Steps 1-4. A combination of interventions mentioned in these four steps may produce the best strategy to achieve long-lasting changes of teachers' conceptions.

Future research

The studies presented in this thesis result in several suggestions for future research, for example inviting a larger sample of teachers to participate and elaborating on our preliminary model, including observations of teaching behaviour, starting a longitudinal study, exploring

the impact of participatory design, or exploring the conceptions of teachers in clerkship training and medical specialty training.

First of all, it is recommended to invite a large sample of teachers from other student-centred curricula in Medicine to fill out the COLT questionnaire, in order to assess the generalizability of our findings. This could result in a quantitative study-design to reveal the impact of different variables on the outcome variables ‘conceptions’ and ‘teaching behaviour’, using structural equation modelling (SEM). Secondly, it is advised to include an observational study of teaching behaviour in follow-up research and to relate the findings of this study to teachers’ conceptions of learning and teaching, personal factors and contextual factors. Thirdly, it would be interesting to perform a longitudinal study to assess changes in teachers’ conceptions of learning and teaching over time. This might provide insights into the development of teachers’ conceptions from a ‘Transmitter’ profile towards a ‘Conceptual Change Agent’ profile, as was suggested in Chapter 4 and in reports by Calkins et al.¹⁰ and Postareff et al.¹¹. At the same time, a longitudinal study might enable assessing the effects of short-term and long-term faculty development interventions, including leadership training for department chairs, or studying the relations between teachers’ conceptions of learning and teaching, teacher motivation and work engagement. Another recommended study design is related to the context of a curriculum change towards student-centred education. In Chapter 3, indications were found that teachers’ conceptions were associated with the participation in different aspects of the process of curriculum innovation, such as educational development, educational research, or management of parts of the curriculum. This might be labelled as ‘participatory design’, an approach which is often used in information technology, in health promotion activities and in instructional redesign in secondary education.^{46,47} Key point is that end users of a system participate in the design of that system. However, another possible explanation of our findings might be that teachers who already had a Conceptual Change Agent profile or a Facilitator profile were more likely to tend to participate in these areas of curriculum innovation. It would also be interesting to invite the teachers of the two medical schools in our studies to fill out the COLT again, and to explore how conceptions have changed over time. Finally, as these studies focused on the first three years of undergraduate curricula in Medicine, it would be very interesting to explore which conceptions of learning and teaching are held by educators in clerkship training and medical specialty training.

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