BACKGROUND, OBJECTIVES, AND RESEARCH QUESTIONS

This dissertation addresses the alignment of learning space with higher education learning and teaching. Significant changes in higher education the past decades, such as increased information and communication technology (ICT) and new learning theories have resulted in the dilemma whether higher education institutions can facilitate tomorrow’s learning and teaching in today’s or even yesterday’s school buildings. In practice, this results in the managerial question: ’How can higher education institutions align the physical learning environment with the developments in learning and teaching?’.

Answering this question requires a focus on two perspectives: product and process. The process is related to the intangible aspects of the topic, such as corporate real estate management (CREM) processes that are pursued to achieve alignment. The product is concerned with the material side of the topic, namely: the physical learning environment itself.

Literature and practice show that there still is a lack of understanding of both the alignment process, and the product that results from this process in terms of the design of learning environments and learning environment typologies that fit user requirements and support new pedagogical approaches. Therefore, the main objective of this dissertation is twofold. First, it explores the alignment of higher education accommodation with higher education learning and teaching
developments. Second, it supports CREM decision-making to align learning spaces with the requirements that result from the developments in higher education. The main research question of this thesis is: ‘Which aspects influence the alignment of learning space with developments in higher education learning and teaching?’ In order to address this question, five sub-questions were formulated (RQ1-RQ5). To answer each sub-question, five studies have been conducted resulting in five research papers. This chapter presents the key findings of the five studies and the overall conclusions of the research.

STUDY 1

Study 1 (chapter 2) aimed to answer RQ1: ‘What are the spatial implications of the developments in higher education learning and teaching?’ The purpose of this study was to explore the spatial implications of new learning theories and the use of ICT in higher education. This chapter builds upon findings from different disciplines: education, didactics, CREM, and facility management. Based on a review of the literature, a theoretical framework was developed that visualises the spatial implications of developments in higher education. To further explore the spatial configurations that support changes in education, a comparative floor plan analysis was conducted at four Dutch Universities of Applied Sciences (UAS). Also, document analyses of annual reports and building walkthroughs were part of the study. The main findings show that traditional classroom space is progressively being replaced by a variety of learning settings to support contemporary learning activities. The research findings contribute to a better understanding of the alignment of learning space to the evolving needs from new ways of learning supported by advanced ICT, and can be used to support space planning in higher education.

STUDY 2

Based on the knowledge of the first study, the next step was to get in touch with the managers who are responsible for higher educational buildings and ask them for their view on the physical learning environment in relation to the developments in higher education institutions. Study 2 (chapter 3) aimed to answer RQ2: ‘How are corporate real estate strategies and corporate real estate operating solutions aligned with the corporate strategies of higher education institutions?’ The substantial changes in higher education lead to evolving corporate strategies. Study 2 aimed to explore how CRE managers of higher education institutions formulate CRE strategies
and CRE operating decisions in order to align CRE with the corporate strategies of these organisations. An analytical alignment framework was developed, which was used to study the connections between CRE and corporate goals at 13 large Dutch UAS. The data collection included a content analysis of the strategic plans of these universities and interviews with CRE managers. The results of the study show various differences between the alignment of corporate strategies with the CRE strategies in the documents and CRE strategies that are applied in practice. It appears that the CRE strategies in-use are more clearly aligned with the corporate strategies than the espoused CRE strategies. Supporting user activities and cost control seem to be the main goals of the CRE strategies and the CRE operating decisions.

STUDY 3
The results of study 2 showed that the CRE managers of higher education institutions particularly apply CRE strategies and operating decisions in practice that are in line with the corporate strategies. An evolving question was, what do they do to achieve that? So, how do they manage the alignment of the accommodation with the needs of the organisation and its end users in practice. Study 3 (chapter 4) aimed to answer RQ3: ‘Which management strategies do corporate real estate managers apply to align higher education accommodation with the user needs?’ The study first outlined the theoretical issues of CRE alignment processes and the management of accommodation needs. It therefore combined insights from disciplines, such as management and organisation as well as information technology with insights from CREM theory. Chapter 4 presents the findings of a multiple case study in 14 Dutch UAS from the perspective of the CRE manager. The empirical study was based on interviews and a questionnaire. The theory in this chapter shows three key process activities in managing the alignment of CRE with the organisation and the needs of the end users: coordination, communication, and decision-making. These three process activities result in two opposite management approaches or strategies that can be characterised by the level of user involvement and control orientation. The two management strategies can be used by CRE managers to reconsider the current process of aligning CRE with the needs and requirements of clients, customers, and end users. This may help to improve the match between demand and supply in order to define future-proof accommodation solutions.
STUDY 4

Apparently, supporting user needs is an important goal for CRE managers. However, study 3 showed that the largest group of users, students, is hardly involved in CREM issues. This may result in limited knowledge of CRE managers about students’ needs and requirements. Study 4 (chapter 5) was conducted to answer RQ4: ‘Which factors influence higher education students’ actual learning space use?’ For this study a diary research method was adopted, in which 52 business management students of a Dutch UAS participated. The students reported which learning activities they worked on during a week, where, and why there. The diary format built on the literature from various disciplines and was used in combination with a questionnaire and interviews. The findings show that students’ learning space use is particularly connected with their study activities. Students use different learning spaces for different activities. They mainly conduct individual learning activities at home and besides for scheduled instructions, students go to school to work in small groups with other students and for social activities. For these learning activities they mainly use learning spaces in open areas, corridors, hallways, atria, and lounges. Next to that, learning space use is related to aspects such as comfort preferences, personal control over the environment and the social influence of peers. Surprisingly, the students’ living situation and the travel time to school are not correlated with the choice of where to study. Student characteristics, such as gender, age, and study year, are only to some extent related to differences in learning space use. The correlation of third places and ICT developments with learning space use is limited too.

STUDY 5

The actual learning space use depends on the availability of learning settings. Settings that are missing, cannot be used to support learning activities. Therefore, the final study of this dissertation explored which learning spaces students would use when they could choose from a set of available settings. Study 5 (chapter 6) aimed to answer RQ5: ‘Which aspects influence the learning space preferences of higher education students?’. To answer this question, a quantitative study was conducted, based on a self-administered questionnaire that was filled in by 697 business management students at a Dutch UAS. The study focussed on individual study activities that require concentration, and on collaborative study activities with peers that require communication. The results show that students consider their physical learning environment to be relevant. In their perception it contributes to the results of their study activities. Students particularly link their learning
space preferences to their learning activities and their goal pursuit at that moment. These results endorse the findings of the diary study that showed a strong link between learning space use and students’ learning activities. For individual activities students prefer learning space at home. However, collaborative study activities with peers are preferably conducted at school. Irrespective of the two given study activities, students prefer quiet, closed learning spaces where they can retreat as an individual or as a small group. Public spaces are not popular for study activities. The findings show that behavioural aspects such as the preferred privacy, interaction, and autonomy, or characteristics of the physical environment (comfort of settings, aesthetics, technical resources and layout) are only to a certain extent significantly correlated with learning space preferences. Student characteristics, such as gender, age, study year, and living situation, have a significant, but limited influence on learning space preferences. The results of study 5 lead to the discussion for how students value their physical learning environment. Do educational buildings actually contribute positively to students’ motivation, or is the physical learning environment mainly a commodity or a hygiene factor that may frustrate students when the environment is not satisfactory?

CONCLUSIONS
Chapter 7 of this dissertation presents the general conclusion and a discussion involving the practical and scientific contribution, based on the five conducted studies. The findings of the five studies in the dissertation contribute to a large diversity of insights in order to answer the main question of this dissertation. This concerned the aspects that influence the relationship between learning spaces and the developments in learning and teaching as well as the evolving requirements of the users in a broad perspective. As a general conclusion of the overall research, the results of the studies are summarised in three alignment mechanisms (indicated as I, II and III), which are presented in figure 1.

The first alignment mechanism (I) concerns the alignment process, referring to management approaches for how to align CRE with the perspectives of the organisation and its end users. Mechanism I involves the process activities of bringing demand and supply together, using different conceptions of the role of the user in alignment issues by focussing on coordination, communication, and decision-making. Depending on how coordination, communication, and decision-making are applied, several management approaches for the alignment process reveal, namely: a control-oriented approach, an involvement-oriented approach, or a combination of both approaches.
The other mechanisms (II and III) can be seen as the result (product) of the alignment process activities of mechanism I. Based on the process activities of alignment mechanism I, CRE managers formulate their CRE strategies that are in line with the corporate strategies, which is presented as alignment mechanism II. In this alignment mechanism, CRE strategies show up as espoused strategies and strategies in-use. Differences between both types of strategies can disturb the alignment of CRE with corporate strategies. Also, these differences can lead to misalignment of CRE strategies with CRE operating decisions. The CRE strategies aim at creating a physical learning environment with learning spaces that fit the educational processes related to teaching and learning. The latter is shown in figure 1 as alignment mechanism III.

According to alignment mechanism III alignment occurs when the physical setting matches the educational process, which result from a specific learning theory. The alignment of learning space with the student needs is a relevant part of alignment mechanism III as well. Alignment particularly occurs when learning spaces match the learning activities of students.
CONTRIBUTION OF THE RESEARCH

This dissertation contributes in several ways to the literature. One of the main contributions of this research is that it not only builds upon different scientific disciplines, such as education, didactics, facility management, corporate real estate management, and learning space design, but also connects them by integrating them in several frameworks. Further research can build on these frameworks. Second, the research contributes to insights into the physical learning environment from an end-user perspective. Third, the research emphasises the differences between espoused CRE strategies and CRE strategies in-use. Also, it shows new insights in the processes that CRE managers can apply for involving the representatives of the demand side at several levels in CRE alignment issues. Finally, the research contributes to the literature through the combination of research instruments that are applied in the several studies, such as a comparative floorplan analysis, diary research, traditional interviews, and surveys.

RECOMMENDATIONS

The thesis presents practical recommendations for aligning learning spaces with learning and teaching developments in two main ways. The first is concerned with learning space planning, such as learning space design, flexibility of learning spaces, layout of education buildings, and spatial concepts for learning spaces. The recommendations can be summarised as:

- Create a learning environment that meets the increased variety in didactical approaches in higher education teaching supported by ICT.
- Create dedicated areas for learning communities. These include student areas, teaching staff areas, and areas for ad-hoc interaction and programmed instructions.
- Create therefore mixed zones with informal meeting space for contact between students and staff, as well as among staff or students for educational goals as well as for social purposes.
- Distinguish areas that particularly support study activities or social activities in educational buildings.
- Create activity-based learning environments for students that support concentration, routine work, and communication; not: ‘one-size-fits-all’.
- Separate learning spaces for students from circulation areas, such as corridors; do not create learning spaces in corridors.
- Meeting space is close to circulation areas to stimulate encounters by chance.
- Experiment with hybrid instruction areas or intelligent classrooms that support new learning and teaching approaches where the teacher
is the ‘guide on the side’ for self-regulated students who work together in small groups supported by ICT-facilities.

The second category of recommendations is related to improving learning space management. This includes formulating appropriate CRE strategies, learning space use, and user involvement. Higher education institutions are recommended to organise user involvement not only when user information is needed for building adaptations or construction projects, but as an ongoing process. A next recommendation is to not only involve policy makers and course managers in CRE alignment issues, but also lecturers and especially students, which represent the largest user population in educational buildings. When formulating CRE strategies, CRE managers preferably focus on a balanced combination of CRE aspects related to effectiveness, efficiency, and experience. The focus depends on the purposes of the several stakeholders on the demand and supply side that are involved in CRE alignment issues. This requires mutual understanding and the development of a common ‘language’ regarding the alignment of CRE with educational purposes. Finally, CREM professionals would rather be involved in educational developments in an earlier stage for a better understanding of the requirements that result from changes in the core business. On the other hand, this may lead to a better understanding of policy makers, course managers, lecturers, and students of the added value of the physical learning environment for learning and teaching.