General Introduction

Study success and progress in terms of graduation rates in the Netherlands are worrying. The report of the Educational Inspectorate (2009) demonstrated that only 31.3% of the students who started a three-year Bachelor's program at a Dutch university graduated after four years[1]. Moreover, 46.8% of the students dropped out the program within four years (Educational Inspectorate, 2009). Although graduation rates showed an increase since the report of Educational Inspectorate in 2009 (Educational Inspectorate, 2017), there is still room for improvement. Poor study success rates have negative consequences for both students and universities. Policymakers in the Netherlands therefore strive for higher quality of education within higher education institutes. To reach a higher quality of education, several changes in educational methods have been proposed (Ministry of Education, Culture and Science, 2011; 2015). The implementation of educational approaches in higher education that *activate* students in their own learning process and that create more strict criteria for students are two of the proposed changes (Ministry of Education, Culture and Science, 2011).

The report of the Educational Inspectorate showed that of all disciplines, the graduation rate among Dutch law students after four years was the lowest (i.e., 21.4%) and dropout the highest (i.e., 60.3%). The Erasmus School of Law, the Law Department of the Erasmus University Rotterdam (EUR), was no exception in this regard. To improve the study success, a new, student-centered educational approach in the three-year Bachelor's programs (i.e., Dutch law, Tax law, and Criminology) was implemented in September 2012. The Erasmus School of Law adopted the educational approach of problem-based learning (PBL) and, by doing so, aimed to make students more actively involved in their own learning process. Also, more strict criteria for students to continue their study were implemented. In the first year of the Bachelor's program, students were confronted with another examination system in which they were obliged to obtain all 60 course credits in order to continue to the second year. This system became known as "Nominal is Normal," indicating that it should be normal for students to complete a first year in the nominally available time of 12 months. (Vermeulen et al., 2012). Two main characteristics of "Nominal is Normal" were: (1) that the number of resits of examinations has been substantially reduced; (2) that students were allowed to compensate low, insufficient marks with higher sufficient marks.

The educational program at the Erasmus School of Law was very different in the period before the implementation of these changes. Before September 2012, the educational program was more traditional in nature. Large-scale lectures were offered multiple times a week and some courses offered weekly working groups, in which a specific law case was discussed with the teacher. Furthermore, students were obliged to obtain only 40 out of the 60 course credits to continue to the second year.

1 In the Netherlands, graduation rates are measured after four years.

The implementation of PBL and the strict standard of obtaining 60 study credits had two main goals. The first goal was to improve the quality of learning of students within the Erasmus School of Law. The second goal was to improve study success and progress in terms of higher graduation rates. This dissertation investigated the question whether these two goals have been reached five years after the implementation of PBL and the examination system "Nominal is Normal".

PROBLEM-BASED LEARNING

PBL is a student-centered educational method that has been developed in the 1960s at the medical faculty at McMaster University in Canada. Students at that time experienced difficulties with understanding certain topics and did not see the relevance of these study topics for their future profession of medical doctor (Barrows, 1996). As a result, they often were lacking the motivation to study. To overcome these issues, a new instructional method, called PBL, was developed. In PBL, learning takes place in small groups under guidance of a tutor (Barrows, 1996). Students work on realistic problems that challenge and motivate them. Over the years, PBL has been implemented in many medical schools over the world, as well as in other disciplines (e.g., social sciences, business, engineering; Barrows, 1996; Hmelo-Silver, 2004; Loyens, Paas, & Kirschner, 2012). PBL was developed with several goals in mind (Hmelo-Silver, 2004; Loyens et al., 2012; Norman & Schmidt, 1992): (1) the development of a flexible and extensive knowledge base, (2) acquisition of effective collaboration skills, and (3) problem-solving skills, (4) making students intrinsically motivated, (5) and helping students to become self-directed learners.

The PBL process consists of three phases (Hmelo-Silver, 2004; Loyens et al., 2012; Schmidt, Van der Molen, Te Winkel, & Wijnen, 2009b): the initial discussion phase, self-study, and the reporting phase. During the initial discussion, groups of ten to twelve students discuss a realistic, complex problem, which is usually a described situation that could happen in real-life. Students discuss the problem collaboratively, trying to explain the situation. Students base their opinions on their own experiences and common knowledge and they activate their prior knowledge doing so. Since the problem is designed as the starting point of the learning process, questions about certain aspects of the problem remain. Together so-called learning issues are formulated, which help students in the second phase, self-study. Students select and study literature sources in an attempt to answer the learning issues by themselves. After a few days, students return to the same group for the third and final phase, the reporting phase. The studied literature and answers to the learning issues are discussed collaboratively in the group. Ideally, all students study different literature sources in the self-study phase, and hence students can add to each other's contributions when addressing the learning issues. A

tutor is present during the initial and reporting phase. Instead of providing students with direct information, the tutor acts as facilitator. He or she makes sure that students elaborate on course material by themselves. A way to accomplish this is, for example, by asking in-depth questions (Loyens et al., 2012; Schmidt, 1983).

Thursday October 13th 2014 |

Failed drug deal

Last Tuesday, a drug deal went completely wrong in the city center of Rotterdam.

ROTTERDAM – Drug dealer Matthew J. got caught up by surprise last Tuesday. Dan K., one of his buyers, robbed Matthew J. from his drugs and money and he stabbed him in the arm with a knife during the robbery. Afterwards, Matthew J. went to his brother John J. Seeing his little brother bleeding, John J. got furious and he swore revenge. After calling an ambulance for Matthew J., John J. loaded his gun and left the house to find Dan K. In a club downtown, he saw Dan K. talking to a man. John J. walked towards him, pointing at his gun and shouted: 'You see this? I'm coming for you after what you did to my brother!' Suddenly, and with high speed, Dan K. ran up to John J. with a knife in his hand. John J. did not see chance to run away and he grabbed his gun. Within a distance of three meters, he shot Dan K, who died instantly. John J. ran off. Thanks to witnesses, John J. could be arrested the next morning. He is now prosecuted for manslaughter.

On account of the news article, John J.'s attorney states that he is certain John J. will not be pursued in court as he was acting out of self-defense on the attack of Dan K.

Figure 1.1 Example of a PBL-problem in Dutch criminal law.

Over the years, different variations of PBL and ways to shape the PBL process have been developed. The Seven-Jump is the method used to shape the PBL process within the Erasmus School of Law (Schmidt, 1983). This Seven-Jump method consists of seven steps that are divided over the three phases of PBL. An example that could serve as problem regarding self-defense during an introductory course in Dutch criminal law, is a situation about a man who purposely seeks confrontation, gets attacked and therefore shoots the attacker (Figure 1.1). Students will discuss whether the actions that took place in the described situation are justified, following the seven steps of the Seven-Jump. Table 1.1 gives an overview of the PBL process using the seven steps of the Seven-Jump method, including specific examples of the problem described in Figure 1.1.

In **Chapter 2** of this dissertation, an extended description of the PBL method at the Erasmus School of Law is provided. In addition, students' and teachers' experiences about PBL are described (e.g., regarding active involvement, knowledge acquisition, and satisfaction).

Table 1.1. Overview of the PBL process using the Seven Jump

Phases of the PBL process	Steps of the Seven Jump method	Example
Initial discussion	1. Clarification of the problem	Addressing all difficulties with the formulation of the problem (e.g., difficult terms)
	2. Formulation of the problem statement	"Is John's action justified?"
	3. Brainstorm: All students give an answer to the problem statement.	Some students might think that John was right to shoot the attacker, others may not.
	4. Problem analysis: A discussion of mentioned explanations in the brainstorm. The discussion should cover the different views that came up during the brainstorm with more depth.	"Why is it or is it not justified what John did?", "Which rules apply when you defend yourself?"
	5. Formulation of the learning issues	"What is self-defense?", "Under which conditions does the right to self-defense apply?"
Self-study	6. Individual search for and study of relevant literature sources, guided by the learning issues	Book chapters, jurisprudence, and articles of the law on self-defense.
Reporting phase	7. Discussion of the studied literature while addressing the learning issues	All different literature sources on self-defense are discussed.

The student-centered, activating nature of PBL is believed to influence students' learning outcomes. This influence can be manifested both in the study processes (e.g., motivation, study strategies and in study outcomes (e.g., impact on academic achievement). This can be traced back to the specific goals of PBL (e.g., Loyens et al., 2012; Norman & Schmidt, 1992). For example, PBL's goal to stimulate intrinsic motivation has more focus on the study *processes*, while the PBL goal of creating a flexible knowledge base emphasizes an influence on study *outcomes*. Study processes and study outcomes are closely related, as the one influences the other (and the other way around). This makes the two research aims described below connected.

In this dissertation, two research aims are attempted to be answered. One focusing on PBL's influence on study processes and the second on PBL's influence on study outcomes. These research aims are in line with the two goals of the implementation of PBL at the Erasmus School of Law: improving quality of learning and improving study progress.

RESEARCH AIM I: PBL AND THE STUDY PROCESSES

Certain skills and learning behaviors are desirable and needed in the professional life after university. For example, being intrinsically motivated, being able to approach learning at a deep level and being a self-regulated learner. Moreover, these study pro-

cesses in turn are determinative for academic achievement and hence study success. For example, academic intrinsic motivation and deep learning are positively and statistically significantly related to academic achievement (e.g., Richardson, Abraham, & Bond, 2012). These skills and learning outcomes are captured in the first research aim of this dissertation, investigating the influence of PBL on study processes.

Motivation

Motivation, especially intrinsic motivation, is shown to be an important predictor of academic achievement (Richardson et al., 2012). Self-Determination Theory (SDT; Ryan & Deci, 2000) is a contemporary, influential theory of motivation. SDT moves beyond the classic distinction between intrinsic and extrinsic motivation and adheres the idea that not all types of extrinsic motivation are detrimental for learning. Instead, SDT distinguishes autonomous and controlled motivation in which autonomous motivation holds intrinsic motivation (i.e., studying because of fun and interest) and the type of extrinsic motivation that enables personal development (i.e., identified motivation; Deci & Ryan, 2000; Ryan & Deci, 2000). Controlled motivation represents the kind of motivation in which self-determination is low. Students study because they avoid feelings of shame and experience feelings of pride (i.e., introjected regulation), or because they experience external pressure, such as trying to obtain a reward or avoiding punishment (i.e., external regulation).

Motivation and Achievement

Previous studies indicated that autonomous motivation is positively related to school achievement (Taylor et al., 2014), deeper learning and persistence (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004), better concentration and time-management in university students (Vansteenkiste, Zhou, Lens, & Soenens, 2005), and lower dropout intentions in high-school students (Hardre & Reeve, 2003). On the other hand, controlled motivation has been negatively related to concentration and time-management and positively related to undesirable study behavior, such as performance anxiety and dropout (Vansteenkiste et al., 2005). Hence, stimulating autonomous motivation is important.

According to SDT, three basic, psychological needs (i.e., autonomy, competence, and relatedness) are to be satisfied in every individual to become more motivated. Applied to the learning context, this means that when the learning environment is able to satisfy the three basic needs, students are more likely to become autonomously motivated to learn (Katz, Kaplan, & Gueta, 2009). The first need, autonomy, refers to having internal control over study activities and the learning process. Competence refers to the feeling of being capable to successfully perform study-related activities. Finally, relatedness refers to the need to feel warmth and support of others, such as teachers and fellow-students (Deci & Ryan, 2000; Ryan & Deci, 2000).

Motivation and PBL

PBL holds elements that can stimulate these three needs. The need for feeling autonomy is stimulated when students are provided with choice and when they take control of their own learning (Ryan & Deci, 2000). Due to the student-centered nature of PBL, students regulate their own learning, whereas tutors only have a facilitating role. This means that the teacher or tutor is more in the background, which is believed to support feelings of autonomy (Black & Deci, 2000). Furthermore, students are offered choice in PBL as well. For instance, they need to formulate their own learning issues instead of receiving learning issues from the tutor. In addition, students select and study their own literature sources, which can foster autonomy as well. In line with this assumption, selecting one's own literature opposed to receiving mandatory literature by an instructor in PBL is proven to result in higher autonomous motivation scores (Wijnia, Loyens, Derous, & Schmidt, 2015). Finally, the amount of autonomy increases when students are progressing in the academic program in PBL. For example, first-year students receive more guidance (e.g., more tips in providing literature and active scaffolding by the tutor) than third-year students.

When students feel successful in their learning tasks, they experience feelings of competence, the second need of SDT. Providing positive, informational feedback and praising students for their achievements, is one way to foster this (Deci, Koestner, & Ryan, 2001). The tutor in PBL provides this kind of feedback on how students function in the tutorial group meetings and on how they prepare themselves for the meetings. Another way to foster feelings of competence is by providing problems based on real-life situations that need to be explained or solved. These "authentic", realistic tasks can help students to feel more competent and confident in handling situations they will encounter in real-life and later in their profession (Dunlap, 2005). If students have the feeling they can tackle real-life situations, it might encourage their feelings of competence.

With regards to the third need of SDT, students want to feel connected and feel warmth of significant others. In the learning context, relatedness comprehends fellow-students and the teacher(s). In PBL, students work in small groups, enabling students to build friendships and to easily approach the tutor. This can contribute to feelings of relatedness. In line with this assumption, PBL students were found to perceive collaboration in the tutorial groups as motivating (Wijnia, Loyens, & Derous, 2011).

In short, PBL is assumed to foster the three needs of SDT (i.e., autonomy, competence, and relatedness), which in turn should lead to more autonomously motivated students. **Chapter 3** of this dissertation addresses the relation between motivation and the PBL approach. A cohort comparison between third-year Dutch law students of the former lecture-based approach is made with the third-year Dutch law PBL students regarding the three SDT needs and students' autonomous and controlled motivation. In addition,

focus groups are conducted to provide a more elaborated explanation of the findings and students' ideas of motivation within PBL.

Learning Strategies

Besides motivation, students' learning strategies constitute an important part of their study process. Different learning strategies are related to academic performance (Richardson et al., 2012). According to Vermunt (1998), learning strategies have two components: The way students process course material (i.e., processing strategies) and the way they regulate or control these processing strategies (i.e., regulatory strategies; Vermunt, 1998). Three types of processing strategies are distinguished (Vermunt, 1998). Students can approach their learning at a deep level, meaning that they are able to connect different concepts together, distinguish relevant from irrelevant information, be critical, and create a deeper understanding of the material (Newble & Entwistle, 1986; Vermunt & Vermetten, 2004). On the other hand, students can also show surface learning or stepwise processing and only memorize information by repetition of the learning material, which results in a more superficial understanding (Newble & Entwistle, 1986). A third processing strategy is concrete processing, meaning that students are able to connect acquired knowledge to real-life situations and prior experiences (Vermunt, 1998).

With respect to the regulation of strategies, students can take responsibility for the learning process by themselves, which is labeled as self-regulation. This holds that students take initiative, are able to set goals, and to plan, monitor, and evaluate their learning process (Boekaerts, 1997; Vermunt, 1998; Vermunt & Vermetten, 2004). On the other hand, students can also depend on external factors for the regulation of learning, such as the teacher or handbook, which is called external regulation (Boekaerts, 1997; Vermunt, 1998). Finally, students can experience difficulties with regulation in general and study with no specific plan in mind, which is referred to as lack of regulation (Vermunt & Vermetten, 2004).

Learning Strategies and Achievement

Many studies have addressed the relationship between learning strategies and academic performance. For example, deep processing is positively related to academic outcomes (i.e., GPA; Boyle, Duffy, & Dunleavy, 2003; Lindblom-Ylänne & Lonka, 1999; Richardson et al., 2012; Zeegers, 2001), while stepwise processing is often found to be negatively related to academic achievement (i.e., GPA; Lindblom-Ylänne & Lonka, 1999; Richardson et al., 2012; Zeegers, 2001). Research findings on the relationship between concrete processing and performance are inconsistent and hence less unequivocal (Vermunt, 2005; 2007).

Previous research also gives evidence of positive relations between self-regulation activities and academic outcomes (i.e., GPA; Boyle et al., 2003; Richardson et al., 2012).

Further, negative relations between lack of regulation and academic outcomes are well-established (Lindblom-Ylänne & Lonka, 1999; Vermunt, 2005). For external regulation and its relationship with performance, findings are less clear (Vermunt, 2005). In sum, deep processing and self-regulation can be considered effective learning strategies, while stepwise processing and lack of regulation are detrimental for learning.

Development of Learning Strategies

Deep processing and self-regulation are not only desirable in terms of achievement, but also because these strategies are useful in life after university. Students then need to have acquired a coherent knowledge base and to be able to educate themselves throughout their professional lives. Therefore, deep processing and self-regulation should be stimulated and improved over the course of higher education. Several longitudinal studies shed light on the development of these strategies. However, these studies show inconclusive results. While an increase in deep processing in higher education was found in some longitudinal studies (Busato, Prins, Elshout, & Hamaker, 1998; Donche, Coertjens, & Van Petegem, 2010; Donche & Van Petegem, 2009; Severiens, Ten Dam, & Van Hout-Wolters, 2001; Vermetten et al., 1999), other studies found no differences of deep processing over time (Rodriguez & Cano, 2007; Severiens et al., 2001; Zeegers, 2001). A similar pattern can be perceived for self-regulation: an increase of self-regulation activities over time was found in a number of studies (Busato et al., 1998; Donche & Van Petegem, 2009; Severiens et al., 2001; Vermetten et al., 1999), whereas others found no change over time (Endedijk, Vermunt, Meijer, & Brekelmans, 2014; Severiens et al., 2001). In a similar vein, results on inefficient learning strategies over time are mixed. For example, some studies found a decrease in stepwise processing or surface learning (Rodriguez & Cano, 2007; Severiens et al., 2001), while others indicated that stepwise processing stays constant over time (Donche & Van Petegem, 2009; Vermetten et al., 1999; Zeegers, 2001). Severiens et al. (2001) showed a decline in external regulation, though in the study of Vermetten et al. (1999), a stable pattern of external regulation was found. A decrease in lack of regulation over time was found by Vermetten et al. (1999), Donche et al. (2010), and Donche and Van Petegem (2009).

To summarize, fostering the use of deep processing and self-regulation over the course of higher education is needed, because of their positive relationship with academic achievement and the importance of these strategies in students' future professional life. Previous studies demonstrated that the learning environment plays an important role in the development of students' learning strategies (Donche et al., 2010; Donche & Van Petegem, 2009; Vermetten, Lodewijks, & Vermunt, 1999).

Learning Strategies and PBL

Different aspects of PBL are believed to stimulate deep processing (Mattick & Knight, 2007; Newble & Entwistle, 1986). First, the process of elaboration is encouraged in PBL. Students activate their prior knowledge in the initial discussion, making it easier to connect new learned knowledge to the existing knowledge in memory (Schmidt, 1983). This results in better retention of knowledge (Dochy, Segers, Van den Bossche, & Gijbels, 2003). The tutor also stimulates the use of deep processing by asking in-depth questions, making sure elaboration takes place. Further, students are stimulated to connect different literature sources together, as well as different concepts during both self-study and the reporting phase. Finally, the process in PBL encourages students to formulate questions (i.e., learning issues), provide an answer to these questions, and discuss the questions, which contribute to deep processing as well. Moreover, concrete processing is encouraged in PBL as information is acquired in the context of an authentic situation (i.e., the problem) that fosters application of knowledge in real-life situations.

Besides deep processing, self-regulation[2] is assumed to be fostered by the process of PBL as well. When students are self-regulated, they are able to monitor and control their own learning processes (Boekaerts, 1997). In PBL, students need to formulate learning issues by themselves, select their own set of literature sources, and evaluate whether they have studied sufficiently to answer learning issues during and after the reporting phase (Schmidt, 2000). Further, students need to prepare themselves for each tutorial meeting that aids students to monitor and carefully plan their self-study time.

Chapter 4 focuses on the differences between third-year Dutch law students of the former traditional, lecture-based program and third-year Dutch law students of the PBL program on their reported learning strategies. **Chapter 5** addresses the development of students learning strategies in the three-year PBL Bachelor's law program. In addition, the relation with students' academic performance is investigated in this chapter.

RESEARCH AIM II: PBL AND STUDY OUTCOMES

The second objective in this dissertation is investigating the influence of the implementation of PBL on study outcomes. Study outcomes are investigated in terms of performance on knowledge tests and study progress (i.e., graduation rates).

2 Self-regulated learning should not be confused with self-directed learning (Loyens, Magda, & Rikers, 2008), one of the goals of PBL (Hmelo-Silver, 2004; Loyens et al., 2012; Norman & Schmidt, 1992). Self-directed learning is to a certain degree similar to self-regulated learning (e.g., active engagement of students), however not identical. While self-regulation can be seen as a learner characteristic only, self-directed learning is assumed to be both a learner characteristic as well as a learning environment characteristic (Loyens et al., 2008). PBL can be considered a self-directed educational method that stimulates both self-directed learning and self-regulation in students.

Knowledge Acquisition, Retention, and Application

As mentioned before, to create a flexible knowledge base in students is one of the goals of PBL (Hmelo-Silver, 2004; Loyens et al., 2012). The processes of prior knowledge activation, elaboration, and learning in a realistic context contribute to knowledge acquisition in students (Norman & Schmidt, 1992; Schmidt, 1983). A large body of research has been conducted on the effectiveness of PBL on knowledge acquisition. In these studies, PBL students are often compared to students of traditional, lecture-based curricula on academic performance. Several meta-analyses showed inconclusive results in this respect. Several meta-analyses demonstrated no differences between PBL and non-PBL students, or even negative effects of PBL on their immediate knowledge acquisition (Albanese & Mitchell, 1993; Dochy et al., 2003; Schmidt et al., 2009b; Vernon & Blake, 1993), whereas a more recent meta-analysis of Dağyar and Demirel (2015) demonstrated that PBL students outperformed students of conventional curricula on academic achievement. However, there are two factors that need to be taken into account when addressing the effects of PBL knowledge acquisition: time and type of assessment.

Knowledge Retention

The meta-analysis of Dochy and colleagues (2003) showed that the timing of assessment is crucial when investigating the effects of PBL on knowledge acquisition. While immediate knowledge tests usually do not demonstrate differences between PBL and non-PBL students (or even differences in favor of non-PBL students), PBL appears to have a positive effect on knowledge *retention* over time. In other words, PBL students seem to retain more of the acquired knowledge over time compared to their non-PBL counterparts (Dochy et al., 2003; Strobel & Barneveld, 2009).

Application and Transfer of Knowledge

The meta-analysis of Gijbels, Dochy, Van den Bossche, and Segers (2005) indicated that the type of assessment matters when investigating PBL's effects on performance. If the distinction between simple levels of knowledge structure (e.g., definitions of concepts) and complex levels of knowledge structures (e.g., connecting concepts and applying knowledge) is made in assessment (Sugrue, 1993), a difference in how PBL students and students of the traditional, lecture-based program perform emerges. PBL students, compared to students of traditional curricula, perform better when assessment focuses on higher levels of knowledge structures instead of focusing on definitions of concepts (Gijbels et al., 2005). Studies that focused on PBL's effects on knowledge application (Masek & Yamin, 2012) and knowledge transfer to a novel context (Bergstrom, Pugh, Philips, & Machlev, 2016; Pease & Kuhn, 2011; Wirkala & Kuhn, 2011) found that PBL students outperform students of lecture-based curricula on these types of assessment. Application and transfer of knowledge are useful during higher education, but are

even more needed in students' professional life after university (Pugh & Bergin, 2006). Transfer is, however, a difficult process that does not happen automatically (Norman, 2009). Students need to be able to recognize and understand the underlying principles in different situations or contexts, which makes it difficult, especially for novice students (Norman, 2009).

An explanation why PBL students perform better, when complex levels of knowledge are assessed, is that the PBL approach is more in line with these kinds of knowledge structures (Gijbels et al., 2005). For example, in PBL, learning takes place in a realistic context, which requires students to link course material to real-life situations and therefore to apply the knowledge learned to a certain extent. This is especially useful when during discussion in the reporting phase, students refer to the problem of the initial phase.

Chapter 6 of this dissertation focuses on differences in knowledge acquisition between learning in PBL and learning from a lecture in an experimental study. Both type and time of assessment are taken into account.

Study Progress

Previous studies have shown that several student characteristics predict study success. For example, female students (Bruinsma & Jansen, 2009; Jansen, 2004; Jansen & Bruinsma, 2005; Richardson et al., 2012; Stegers-Jager, Themmen, Cohen-Schotanus, & Steyerberg, 2015; Van den Berg & Hofman, 2005; Van der Hulst & Jansen, 2002), students of ethnic majorities (Van den Berg & Hofman, 2005; Stegers-Jager et al., 2015) and students who have obtained high pre-university grades (Jansen, 2004; Suhre, Jansen, & Torenbeek, 2013; Stegers-Jager et al., 2015), obtain more course credits, higher grades, or seem to get their degree more often and show less study delay.

The way the learning environment is organized influences study success as well. In terms of more strict criteria for students, Vermeulen et al., (2012) demonstrated that raising the number of required course credits at the end of the first academic year (i.e., 60 instead of 40 credits) improved study progress: more students obtained all course credits in the first year. Moreover, it was found that when less courses are offered parallel (i.e., in succession), students obtain more credits and more students pass the first academic year (Jansen, 2004; Van den Berg & Hofman, 2005; Van der Hulst & Jansen, 2002). Further, when less hours are spent on lectures and more hours on self-study, students reach better study progress (Jansen, 2004; Schmidt, et al., 2010). These characteristics of the curriculum design are all in line with the implemented PBL approach at the Erasmus School of Law. Previous studies on the effects of PBL on study success indeed showed that PBL students have a shorter study duration and are less likely to dropout compared to students of more traditional educational methods (Iputo & Kwizera, 2005; Schmidt, Cohen-Schotanus, & Arends, 2009a).

The aspects of PBL and the processes that take place within PBL (e.g., prior knowledge activation and elaboration) are assumed to stimulate study progress. In the study of De Koning, Loyens, Rikers, Smeets, & Van der Molen (2012) study success predictors in a PBL program were investigated. It was found that, in line with previous studies on study success (e.g., Jansen, 2004; Stegers-Jager et al., 2015), female students, and students with a high pre-university GPA, earned more credit points and obtained higher grades over the course of the three-year Bachelor's PBL program. Additionally, a specific factor in PBL, students' observed learning activities, appeared a strong predictor for study success. Observed learning activities is a rating of the tutor on how well the student was prepared for and how well the student participated during the meetings. The study of De Koning et al. (2012), however, did not make a comparison with students of a lecture-based program, which makes it hard to conclude whether study progress is indeed better in PBL and which factors contribute to this.

In **Chapter 7** of this dissertation, the focus lies on study success predictors in both the PBL program and the former, lecture-based program of the Erasmus School of Law. This way, it is investigated whether graduation rates are indeed improved in the new PBL program and which factors predict study success. Figure 1.2 provides an overview of the research aims of this dissertation and the accompanied chapters.

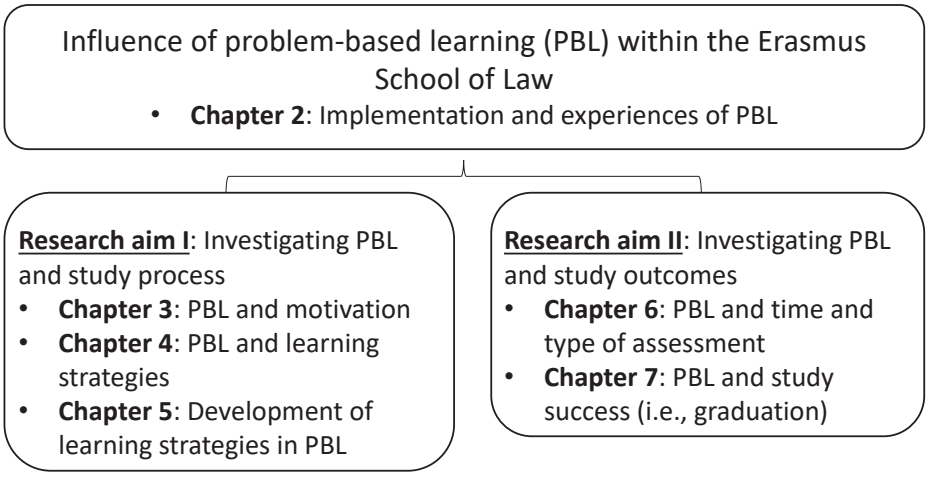

Figure 1.2. Summary of research aims and the content of the chapters