Self-efficacy, motivation and approaches to studying

A longitudinal study of Y and how engineering students perceive their studies and transition to work

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Pleasant reading. Santé à vous toutes et à vous tous!

Tomas Jungert
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List of original papers

This thesis is based on the following papers, which will be referred to as papers I, II, III, & IV in the text.

I Jungert, T. (2008). Opportunities of student influence as a context for the development of engineering students' study motivation. *Social Psychology of Education 11*, 79-94.

II Jungert, T. (2008). A longitudinal study of engineering students' approaches to their studies. *Higher Education Research and Development, 27*, 201-214.

III Jungert, T. (2006). Effects of the CDIO curriculum on engineering students' experiences of their study environment. *World Transactions on Engineering and Technology Education 5*, 357-360

IV Edvardsson Stiwne, E. & Jungert, T. (submitted to *Education and Work*). Engineering students experiences of becoming employable.

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Introduction

The overall aim of this thesis is to longitudinally explore the experiences of four cohorts of students in a Master of Science (MSc) programme in engineering from their first semester until one year after graduation focusing on how they perceive their study environment and transition to work, with a focus on self-efficacy, motivation and approaches to studying. This thesis has a social psychological basic perspective, but aims to unite two theoretical perspectives: a social cognitive perspective and a perspective on approaches to studying. It aims to integrate psychological, social and individual ways of interpreting the student experience. The first aim is to explore how students' perceptions of their opportunities for influencing and taking control over their study conditions are related to their strategic approaches to studying, their intrinsic and extrinsic motivation and their self-efficacy beliefs (papers I and II). A second aim is to explore how students are affected by reforms that were introduced in their programme, which resulted in a partly new curriculum and new ways of treating freshmen (paper III). A third aim is to explore how students experience becoming employable in their transition process from the programme to the world of work (paper IV). An overall theme is the longitudinal design. Following, on an annual basis, cohorts of students from their first encounter with higher education until a year after their graduation, allows an exploration of changes over time regarding a substantial number of variables.

Engineering education in Sweden

About 6,000 students annually enrol in a programme in MSc in Engineering in Sweden (National Agency for Higher Education [NAHE], 2007a). Until 2007, all Swedish MSc programmes in Engineering comprised nine semesters at all universities. The programmes are comprehensive and lead to a second degree, which means that the students commence studying Engineering without previously possessing a degree in Engineering, but curricula and pedagogical profiles differ. In 2007, 4,674 students graduated with an MSc in Engineering, which corresponds fairly well with the anticipated demand for an MSc in Engineering in the labour market (NAHE, 2007b). Of the graduates, 32 percent were women and 68 percent were men. Amongst the men who enrolled in these programmes in 2000/01, 52 percent and 59 percent of the women graduated within seven years. About 20 percent of the female students in MSc programmes in Engineering in Sweden have had problems with a lack of basic knowledge before enrolling in the

programmes (NAHE, 2007c). Students in such programmes have also reported that they to a large extent perceive their studies as being full-time; as many as 90 percent of the women perceive their studies as being full-time, while only 65 percent of the men have such a perception. Furthermore, amongst programmes in Swedish higher education, the programmes leading to an MSc in Engineering have the largest percentage of students who feel that their study rate is too high. Thirty-seven percent of the students in these programmes (nearly 60 percent of the female students and 29 percent of the male students) often or very often have this feeling (NAHE, 2007c). However, the perception of the effects of workload is not always the same as the number of hours worked (Kember, 2004). A number of factors shape the perceptions of workload, such as perceived pressure in terms of demands of the curriculum and assessment tasks (Entwistle & Ramsden, 1983).

At present, there are 33 versions of MSc programmes in Engineering at 14 universities in Sweden and of these, nine include specialisation in Applied Physics. Until 2007, Linköping was the only university to have a programme with the combination of Applied Physics and Electronics[1]. This is the programme focused on in this thesis, and will be referred to as the Y programme. At Linköping University, the Y programme has been marketed as a prestigious programme with the aim of providing students with an MSc in Engineering who are capable of working at the international forefront of technical developments. The programme is as focused on research as other MSc programmes at the university.

The expansion of higher education was partly intended to increase the enrolment of students in science and engineering programmes (Bauer, Askling, Marton, & Marton, 1999). In particular, studies in science and engineering are considered important for a strategic development of industrial growth and for the continued development of certain sectors of commerce. As a consequence of the expansion of higher education, students have a more heterogeneous background today than has been the case before (NAHE, 2009). Most socioeconomic groups benefited from the expansion of higher education and students vary to a great extent in terms of their previous experience and educational background. Thus, a major challenge facing institutions of higher education is to adapt to a heterogeneous group of students in engineering. Institutions in higher education may therefore need to elaborate the context of higher education to improve the throughput of students.

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[1] This programme is called Y at Linköping University and whenever people talk about this MSc programme in engineering, they refer to it as Y.

The context of higher education is a fairly complex term. In higher education, we may refer to the social, academic, educational, classroom, learning, and teaching contexts amongst other things. In this thesis, the terms context of higher education and academic context will be used in the discussion of some theoretical concepts. When results from the thesis are discussed, the term study conditions will be used because it is not as broad and complex a term as context. Study conditions refer to departmental characteristics such as workload, freedom of choice, feedback to students and course design.

Even if this thesis contributes to the research field with new findings and conclusions about student experience, some of the most influential contributions in the field are considered. The first one is a model developed by Entwistle and Smith (2002). The second is Bandura's social cognition model (Bandura, 1986; 1997). In both models, one assumption is that students' level of motivation, affective state and actions are based more on what they believe than on what is intended by the institutions. This is why students' perceptions of their study conditions and their opportunities to influence them, their motivation, and their study strategies are focused on in the data collection. The model by Entwistle and Smith (2002) describes three groups of factors influencing student learning: students' characteristics, teaching characteristics, and departmental characteristics. Bandura's model assumes that people strive to exercise control over events that affect their lives. In this thesis, the focus is on the parts of the Entwistle and Smith model that students strive to control and some of the means they use to take control over their lives as students. For example, how students control characteristics such as how they motivate themselves when studying, how they develop certain work habits and strategic approaches to studying and how they perceive their opportunities to influence their study conditions, i.e. departmental characteristics, such as course objectives, assessment procedures, workload and freedom of choice. When students set out to take control over their lives as students by influencing these characteristics, their beliefs in their causative capabilities are of great importance because efficacy beliefs influence how they act, think, feel, and motivate themselves (Bandura, 1995). Different forms of student motivation are part of the conceptual models such as the difference between intrinsic and extrinsic motivation. In this thesis, Deci and Ryan's self-determination theory (SDT) (Deci & Ryan, 1985; Ryan, Connell & Deci, 1985; Reeve, Ryan, Deci, & Jang, 2007) is used to cover the motivational aspects of the two models. Finally, students' transition from higher education to the world of work is considered.

The context of engineering students' experiences of their study conditions has been described as highly demanding in several studies (Case

& Gunstone 2003; McCune & Hounsell 2005; Scheja 2006). Students feel that they are under considerable pressure and have heavy workloads. Depending on the study conditions and on how it is perceived, students develop a disposition to studying on three levels. On the first level, students adopt different approaches to learning, *e.g.* deep and surface (Biggs 1987; Entwistle & Ramsden, 1983; Marton & Säljö, 1976). On the second level, students adopt what Entwistle and Ramsden (1983) refer to as a strategic approach to studying. This level deals with students' intention to do well in their courses and results in a number of strategies that students use to adjust themselves to the study conditions. For example, they may be cue seekers (Miller & Parlett, 1974), taking 'shortcuts' (Eizenberg, 1988), adopt an achieving motive (Biggs, 1987), which is characterized by competition and ego enhancement (Wilding & Andrews, 2006). Students may also focus on managing time rather than focusing on understanding (Case & Gunstone, 2003), and "setting aside work within certain courses to concentrate on imminent tasks" (Scheja 2006, p. 430). The strategic approach to studying has a number of sub features such as how students organize their studying, manage their time, concentrate on work, and monitor effectiveness. Consequently, the strategic approach to studying has recently been sub-divided into monitoring studying, study organization and time management and effort and concentration (Entwistle, Nisbet, & Bromage, 2004).

On the third level, students attempt to influence their study conditions by various means. On this level, students adopt strategies for influencing their study conditions with the goal of changing their departments or the design or content of courses, and they interact with teachers and peer students in order to take control over their studies (Jungert & Rosander, 2009). Thus, strategies for influencing study conditions involve an additional kind of strategy, with the goal of changing department policies, the design or content of courses, or how students interact with teachers and peer students in order to take control over their studies. The main difference between the second and third level is that students on the second level adjust themselves to their study conditions, whereas on the third level, students either try to change or influence their study conditions in various ways. It is the third level that is explored in this thesis.

Students with differing abilities, strategies and motives may perceive their teaching-learning environment in terms of workload, freedom of choice, and feedback in quite different ways (Entwistle & Smith, 2002). Self-determination theory is a motivational theory that is heavily focused on the interaction between the internal and external environment. For students to be intrinsically motivated, they need to find innate satisfaction rather than satisfaction for some separate consequence (Ryan & Deci, 2000). In self-

determination theory, all humans are believed to have a psychological need to feel autonomous, competent and related to other human beings. The need to perceive oneself as competent also plays an important role in the social cognitive theory (Bandura, 1986, 1997; Pajares, 1996; Pajares, 2005). When students' psychological needs for autonomy, competence and relatedness are met, their self-efficacy beliefs are enhanced and, as a result, their innate motivation to learn is triggered (Pintrich, 2003).

Students' experiences, study motivation and belief in their own capabilities can affect how they perceive and interpret their opportunities to influence their study conditions and how this may be manifested in a complex and interacting process. A presupposition in this thesis is that the interacting process of the study conditions and students' perceptions of them can enhance or hinder their opportunities to influence their study conditions.

The aims of the thesis

Ability is nothing without opportunity. Napoleon Bonaparte

In this thesis, the overall purpose is, through a longitudinal design, to explore and describe self-reported perceptions of the students' study conditions throughout their studies in an MSc programme in Applied Physics and Electrical Engineering.

The questions addressed in this thesis are:

1. How do students perceive their opportunities to influence and control their study conditions (i.e. student influence) and does this change during the course of their studies? (papers I, II and III)
2. Do students' perceptions and how they make use of their opportunities to exert an influence have consequences for their study motivation, their beliefs in their capabilities and does this change during the course of their studies? (paper I)
3. How are students' perceptions of their opportunities to achieve student influence enacted in approaches to studying and does this change during the course of their studies? (paper II)
4. Do students' experiences of satisfaction with their studies, average working hours and perceived workload, social isolation, opportunities to influence their studies, having contact with teachers, and cooperating with peer students differ between the cohorts and change during the course of their studies? (paper III)
5. What aspects of the programme do students rate as most valuable as regards their prospects on the labour market and are there differences between the cohorts? (paper IV)

6. What strategies do students develop to become employable and how do they experience becoming employable? (paper IV)

As is clear from most of the research questions, the focus in this thesis is on how students perceive their opportunities to influence their study conditions and how this may be related to other important variables. Influence may be manifested by influencing study conditions in the classroom (e.g. Tinto, 1997; Fritschner, 2000) and in out-of-class interactions such as informal relationships between students and faculty (e.g. Jungert & Rosander, 2009; Terenzini, Pascarella, & Blimling, 1999). This can be accomplished by means of various strategies. Strategies are not necessarily pragmatically rational. They may be a result of students' opportunities, values and emotions (cf. Ball, Davies, David, & Reay, 2002). Students' perceptions of their study conditions in terms of class size, faculty authority (Weaver & Qi, 2005), workload, freedom of choice, and feedback (Entwistle & Smith, 2002) can enhance or hinder students' opportunities to influence their study conditions. For example, research has shown that heavy workload has an effect on approaches to studying (e.g. Ramsden & Entwistle, 1981; Dahlgren, 1984; Kreber, 2003), but it has also been argued that the effect could be the reverse (Kember & Leung, 1998). In paper I and paper II, the results indicate that perceived workload, feedback and perceived opportunities to influence their studies had a large impact on the students' strategies and approaches to their studies.

In this thesis, student influence is defined as choices students make, in which they exert power in controlling and influencing their study conditions, as shown in their choices. In paper I, student influence was elaborated and it was found that it can be both direct and indirect. There can furthermore be (a) formal opportunities to influence study conditions, (b) informal activities, and (c) statutory activities that students rely on in order to improve their study conditions. A summary of these various forms of influencing study conditions, which was developed in paper I, is provided in Table 1.

Table 1
Forms of student influence perceived by students

Influence	Direct	Indirect
Formal	Attendance/ Non-attendance	Class representatives
Informal	Relationships with faculty	Relationships with peers
Statutory	Course evaluations	Student representatives

Two examples of direct formal influencing are when a student, to facilitate his/her study conditions, chooses to skip some courses to reduce the workload, or when a student attends a lecture and tries to influence the teacher about what should be the main focus in a course. Indirect formal influencing may be when a student has opinions about teaching, and asks a class representative to hold a debate about this in formal meetings with the faculty. Informal influencing refers to how students try to influence teachers and peers in order to receive more feedback or obtain help with problems concerning a course. Finally, statutory influencing is when students personally fill in course evaluations (direct) or have a student representative present personal opinions about teaching or course design (indirect).

Context of the thesis

A distinguishing characteristic of Swedish higher education is the students' formal rights to influence their study conditions. The students have the opportunity to influence their courses and programmes by being represented in the universities' decision-making bodies and by taking part in the course evaluations that all Swedish higher educational institutions are required to carry out at the end of every course (Svensk Författningssamling [SFS], 1998). The purpose of course evaluations is that the students who have participated in a course shall have the opportunity to present their experiences and opinions regarding the course, *e.g.* the content and the structure of the course and the pedagogical skills of the teachers involved in the course. The university is also responsible for the compilation of course evaluations and for informing the students about the results and possible measures to be taken on the basis of the course evaluation. The results of course evaluations must be accessible to the students (SFS, 1998).

Furthermore, Swedish students have the right to be represented on the board of the university, on the faculty board and in the specific educational and research bodies as well as in all bodies at the university whose activities are of importance for the students' education and situation. Consultations must be held with student representatives before major decisions that concern students are taken (SFS, 1998).

At Linköping University, a programme for the development of the quality of the teaching-learning environment has been drawn up in which central fields are the role of the students in their education and renewal of curricula and examinations (Linköping University, 2009). This indicates that the university is focusing on strengthening the position of the students. A policy for course evaluations that defines the purpose of course evaluations,

which is to give feedback on courses by reflecting over them and critically scrutinizing and questioning them, has also been developed (Linköping University, 2006). The evaluation should be carried out in conjunction with the course, should be carried out continuously and teachers of the course should meet with the students. Furthermore, it is emphasised that the results of the evaluations should be followed up, that a written evaluation be made and that students are informed about previous results of course evaluations. At the faculty of technology, there is a uniform system for how course evaluations should be carried out (Linköping University, 2007). A specific section in the student union organises the evaluations, which are performed in the form of discussions in a meeting between student representatives from the section and the examiners from the course. Minutes are written on the basis of the meeting, which is communicated to student counsellors, the concerned boards of the faculty and the teachers (Linköping University, 2007). There are continuous discussions concerning how to improve the system of the course evaluations and the feedback of their results. Currently, there is a web-based system for course evaluations in order to increase the response rate of the students (Linköping University, 2006).

In an inquiry by the Swedish National Agency of Higher Education (NAHE, 2003), Linköping University was judged to have been most successful in giving students more opportunities to influence their study conditions. The Agency reported that students' had considerable opportunities to influence their study conditions since students to a high degree participate in the quality work in decision-making and in bodies at various levels, and the structure for cooperation between teachers, administrators and students was highly developed (NAHE, 2003). Furthermore, the course evaluations seemed to function well, but the feedback of the evaluations' results must be improved. The Agency's assessments were based on policy documents, rules, student representation in bodies, the number of trained student representatives, and follow-ups of course evaluations (NAHE, 2003).

Curriculum

I would live to study, and not study to live. Francis Bacon

The Y programme has a large proportion of scheduled lectures, laboratory work and lessons. The lessons are classroom sessions for less formal instruction, such as working through problems. Course assistants, who are not principally faculty members responsible for the course, *e.g.* a PhD student or a senior student, lead both lessons and laboratory work. The content is

organized into a large number of both sequential and parallel courses. The students take part in the same curriculum for the first two years, designed to lay a basic foundation for their subsequent studies. After completing their basic studies, they can choose to specialise in one of twelve engineering fields to prepare themselves for a professional qualification, see Table 2.

Table 2
Curriculum of the Y programme

Year 1	40 weeks	Predefined curriculum for all students. Basic studies in *e.g.* Mathematics, Algebra, and Programming.
Year 2-3	80 weeks	Predefined curriculum for all students. Basic and advanced studies in *e.g.* Computer Science, Electronics, Mechanics.
Year 4	40 weeks	Selection of specialisation engineering field, 12 electives available. Elective courses.
Year 5	20 weeks	Masters thesis.

The majority of specialisation courses are conducted in traditional format (c.f. Novak, 1998) but one is designed according to the ideas of problem-based learning (PBL), a student-centred method, and some have features of projects. The work on the Masters thesis, which has a topic within the specific area of specialisation, is mainly carried out at companies. The students are expected to focus completely in their studies, but may devote most of their time, except for assigned laboratory work, to self-instruction if they so wish.

Previous research

In this section, the main concepts and theories of this thesis will be described. The main concepts are approaches to studying, motivation, self-efficacy and transition, but other, closely related constructs will also be discussed.

Approaches to learning and studying

Try to learn something about everything and everything about something. Thomas Huxley

One approach to learning is how intention and process is combined in learning. Abundant research has shown that students in higher education adopt several approaches to learning and that each approach depends on the context, the content and the demands of the learning task (*e.g.* Marton, Hounsell, & Entwistle, 1984). In what is called the Gothenburg studies, Marton and Säljö (1976) describe two approaches to learning, deep and surface. In the deep approach, the student recognizes the more abstract forms of learning that are required (Svensson, 1977). In the surface approach, on the other hand, the focus is on the superficial parts of the material that are to be learned (Dahlgren & Marton, 1978). Entwistle and Ramsden (1983) made an important development of the Gothenburg studies by including the strategic approach of the students. This involves the maximisation of grades and the student's beliefs about the characteristics of assessment. In other words, the strategic approach to studying is related to study behaviour rather than to learning processes and concerns the intention to do well in a course and to achieve personal goals. The strategic approach to studying focuses on study processes involving organized studying and time management (Entwistle & Ramsden, 1983; Biggs, 1987). In a conceptual model of the teaching-learning process in higher education, Entwistle and Smith (2002) seek to explain different learning strategies and outcomes (Figure 1).

This model describes the main influences on approaches to learning, approaches to studying and aspects of the teaching-learning environment. The model includes both students' and teachers' earlier experiences and expectations and covers the interactions that exist between *e.g.* students' approaches to studying, approaches to learning, outcomes and their differing perceptions of various aspects of their teaching-learning environment (*e.g.* feedback and workload) (Entwistle & Smith, 2002). According to the model, approaches to learning are mental orientations and approaches to learning and studying seem to be influenced by aspects such as student work habits, workload, and feedback (Entwistle & Smith, 2002).

The primary focus of the model is on student learning, but a strategic approach to studying helps to explain how students adjust their ways of studying to perform well in assessments.
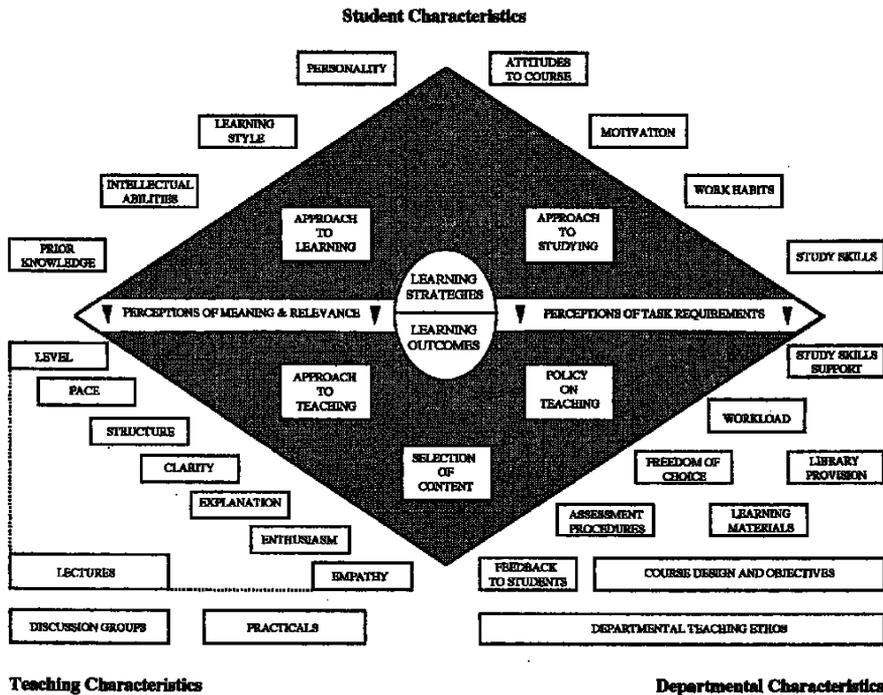
Figure 1. Conceptual model of the teaching-learning process in higher education (Entwistle & Smith, 2002).

The focus in this thesis is delimited to the parts that are related to a strategic approach to studying, i.e. student characteristics such as attitudes towards courses and motivation, and departmental characteristics such as workload, freedom of choice, feedback to students and course design.

In paper II, it was found that, in addition to adopting strategic approaches to their studies, students developed three approaches to studying – adaptive, critical and cooperative. Students could develop any of these three approaches to studying depending on how they perceived the workload, feedback from teachers and their opportunities to influence their studies. This shows that how students perceive their opportunities to influence their study conditions also influences their strategic approaches to studying. In much of the research on approaches to studying, students' learning and outcomes have been examined, whereas their strategies for influencing and controlling their study conditions have in part been overlooked. For example, there is nothing in the Entwistle and Smith model that deals with students' opportunities to influence their study conditions.

Parallel with this field, there is research focusing on metacognition and study strategies, i.e. ways in which students regulate their motivation and enhance their learning. This research has focused on cognitive processes such as volition (Corno, 1994), self-regulation (Schunk & Zimmerman, 2008; Wolters, 1998; Zimmerman & Schunk, 2001) and motivation (Pintrich, 2003). Volition concerns how students strengthen their will to achieve a goal until its accomplishment (Corno, 1993) and self-regulation relates to personal strategies intended to acquire skills and knowledge (Pintrich & Zusho, 2002). When it comes to motivation, there is a lack of clear definition of motivational constructs (Murphy & Alexander, 2000; Schunk, 2000). In educational psychology, there is a focus on achievement goals as a key precursor of motivation (Ames, 1987; Pintrich, 2000a). In the next section, the term motivation will be discussed in more detail.

Motivation

To be motivated is to be moved into action. Arthur Schopenhauer

Theories of motivation usually include the notion of intention as a central concept (*e.g.*, Lewin, 1951/1997). This notion involves a distinction between motivated and amotivated behaviour, i.e. between intentional and non-intentional actions. Three examples are personal versus impersonal causality (Heider, 1958), voluntary responding versus helplessness (Seligman, 1975), and internal versus external locus of control (Rotter, 1966). Self-determination theory (SDT) (Deci, Vallerand, Pelletier, & Ryan, 1991; Vallerand, Pelletier, & Koestner, 2008), which focuses on the extent to which the behaviours of people are volitional or self-determined, has an important additional distinction within the class of behaviours that are intentional or motivated. In SDT, there is a distinction between self-determined and controlled types of intentional regulation. Motivated actions are self-determined and carried out because of enjoyment in exploring, mastering and learning, i.e. an individual's intrinsic motivation (Deci et al., 1991). Controlled actions are, on the other hand, compelled by some interpersonal force, and carried out because of extrinsic motivation. SDT postulates three types of motivation along an axis: (1) amotivation, which results from students' attaching a low value to learning tasks and not feeling competent to perform them; (2) extrinsic motivation, which results from students' needing rewards to engage in learning; (3) intrinsic motivation, which results from students' enjoyment of learning. Extrinsic motivation is a complex construct ranging from external regulation (students needing external rewards or fearing punishments), to introjected regulation (students needing to preserve

their self-image), to identified regulation (students recognizing the value of learning for their own goals) (Deci & Ryan, 2000).

Self-determination theory integrates human needs and social-cognitive constructs (Pintrich, 2003). According to SDT, all human beings have an innate propensity for assimilating new information and integrating it into their own knowledge structure but they also have a psychological need to feel autonomous, competent and related to other human beings. Students feel autonomous in learning environments that provide some control over what is being taught and the pace of instruction, and in which their thoughts and feelings are acknowledged (Filak & Sheldon, 2003). The greater the perception of autonomy in the learning environment, the higher the student's self-determined motivation to learn the subject (Sheldon, Elliot, Kim & Kasser, 2001). In some cases, a student may not be intrinsically interested in a subject, but may recognize the value of knowledge of the subject for a chosen career. This extrinsic motivation (identified regulation) to learn such subjects rises with higher perceptions of an autonomy-supportive learning environment. In paper I, students accepted course assignments with doubtful learning opportunities because such assignments were important for the status and good reputation of the programme and could increase their opportunities to get jobs as qualified engineers, which could result in both introjected and identified regulation.

As in the Entwistle and Smith model (2002), social and cultural aspects of the teaching-learning environment are of significance for the motivation and performance of the students within the context of SDT. For example, researchers have shown that students' classroom performance and persistence are positively influenced in learning environments where teachers employ autonomy-supportive practices (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004) and negatively influenced when teachers employ controlling practices, *e.g.* rewards and punishments (Deci, Koestner, & Ryan, 1999). Even subtle cues of control undermine student motivation. Ratelle, Guay, Larose and Senécal (2004) found that, as teacher control in terms of class management and attendance decreased in the transition to higher education, the intrinsic motivation of the students increased over time. However, their study showed that motivation did not develop homogeneously amongst the students, which shows how complex motivational processes are.

Relatedness refers to the need to interact with others in order to promote enjoyment of a task (Deci & Ryan, 2000). The perception of relatedness in an academic context functions as a motivational resource needed to activate effort and to motivate persistence when students are faced with challenging academic tasks (Furrer & Skinner, 2003). Relatedness to the teachers has

been shown to impact positively at the post-secondary level (Black & Deci, 2000).

Students' need for competence has rarely been studied in isolation in an academic context (Levesque, Zuehlke, Stanek, & Ryan, 2004) because numerous studies, beginning with Ryan (1982), have shown that increased perceptions of competence must be accompanied by perceptions of autonomy if they are to have a positive effect on performance. Students perceive themselves to be competent when they are effective in learning. To be effective, students must be given tasks with an optimal challenge. A large body of literature shows that challenging tasks raise motivation and performance attainment (Latham & Lee, 1986; Mento, Steel, & Karren, 1987).

In general, giving students opportunities to choose, which enhances perceived autonomy and control over learning, appears to enhance their intrinsic motivation (Ryan, Connell, & Deci, 1985)[2]. Furthermore, perceived control represents a key determinant of self-regulation efforts (Ames, 1992; Pintrich, 2000b). Self-efficacy is another important influence on self-regulation (Fiske & Taylor, 2008). Self-efficacy will be explored in the next section.

Self-efficacy

They are able who think they are able. Virgil

In social cognitive theory (Bandura, 1986), people are seen as self-organizing, proactive and self-regulating, rather than reactive and governed by external events. Self-regulation concerns how students regulate aspects of their thinking, motivation and behaviour during learning (Pintrich & Zusho, 2002). Self-regulated learners set goals for their learning and regulate and control their cognition and motivation and adopt strategies to achieve their learning goals. The best conditions for promoting internal motivation and perception of self-efficacy, and for encouraging students to employ self-regulatory strategies, are created when individuals' perceived controllability is enhanced (Bandura & Wood, 1989) and when they are granted large opportunities to participate in decision-making in class (Ames, 1992; Zimmerman, 1995).

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[2] There are cultural differences in cognition (Masuda & Nisbett, 2001). Compared with European Americans, who showed more intrinsic motivation and learning when they could make personal choices, Asian Americans performed better and enjoyed tasks more when they were told that someone close to them had chosen the task for them (Iyengar & Lepper, 1999).

In social cognitive theory, perceived self-efficacy functions as an essential factor in self-regulatory mechanisms (Bandura & Wood, 1989). Self-efficacy is defined as "the belief in one's capabilities to organize and execute courses of action required to produce desired attainments" (Bandura, 1986, p. 391). It is the judgements people make regarding their capabilities to organize and execute courses of action that are needed to achieve the selected performance. Beliefs about the contingency between behaviour and expected outcome and these expectations affect the individual's choices of activities, effort and maintenance of behaviour. According to Bandura (1995, 1997), perceived efficacy plays a key role in how humans perform because it directly affects factors such as goals and aspirations, affective tendencies, outcome expectations, and perceptions of opportunities in the social environment. It is what people believe they can do with whatever skills and abilities they may possess that is considered important, not the actual skills and abilities that they possess (Bong & Skaalvik, 2003). Self-efficacy beliefs affect the individual's aspirations and strength of commitment in a very wide variety of settings. Such beliefs influence analytical and strategic thinking, motivation, and perseverance in the face of difficulties and obstacles. Perceived capability in a course may be both varied and complex. In the academic context, students' beliefs about their abilities to achieve academic tasks successfully, i.e. their academic self-efficacy beliefs are strong predictors of their ability to successfully carry out those tasks (e.g. Bandura, 1997; Skaalvik & Skaalvik, 2008). Students' perceptions of their efficacy to regulate their own learning and to master academic activities determine their level of motivation and academic accomplishments (Bandura, 1993). Students are believed to act if their acts boost feelings of competence, control and effectiveness (Bandura, 1997).

Bandura (1995; 1997) mentions four sources that may develop and alter self-efficacy beliefs: (1) Interpreted result of one's performance (mastery experience) (2) vivid experience one undergoes when observing others performing tasks (vicarious experiences), (3) verbal messages and social persuasions received from others (social persuasion) and (4) physiological and emotional states such as anxiety and stress. The information acquired from these different sources is then cognitively appraised (Bandura, 1997). How students perceive their study conditions directly influences their self-efficacy. For example, student perceptions of classrooms as supporting mastery evaluation and autonomy positively impact self-efficacy (Greene, Miller, Crowson, Duke, & Akey, 2004). The initial self-efficacy fluctuates as a function of ability and earlier experience, and is confirmed when students observe goal progress or are given feedback that communicates skilfulness (Elliot & Dweck, 1988). Difficult goals are believed to develop skills more

effectively than easy goals, as difficult goals offer more information about ability. Models such as teacher and peer students are important sources of explicit efficacy information (vicarious experience), and observing models can be very beneficial in supporting efficacy and motivation (Bandura, 1997).

Academic self-efficacy is, according to Zimmerman (1995), profoundly affected by students' earlier encounters with identical or similar tasks. Academic self-efficacy is influenced by cognitive interpretations of success and failure in tasks, but also influences effort, persistence and the cognitive resources that are used in seeking to interact with the academic context. Motivation and efficacy are enhanced when learning progress and comprehension are perceived. Strategies may influence self-efficacy and motivation, and students who believe that a new strategy can improve their performance may keep their initial motivation even if they perceive little progress if the new strategy gives a sense of control over achievement outcomes. In paper I, students who participated in relationships with faculty and student activities increased their perceptions of informal opportunities to influence their study conditions and sense of control, which enhanced their self-efficacy. High self-efficacy perceptions are also believed to make individuals engage in tasks that develop their skills and capabilities, while low-efficacy perceptions make students choose tasks that will not need development of new skills (Schunk, 1991).

Pajares (1996) found that the self-efficacy of gifted students was based on their perceptions of their cognitive ability. In another study, Zimmerman and Kitsantas (2005) suggest that high self-efficacy students attribute more responsibility to learners than to teachers and that perceived responsibility was an important motive for academic achievement. In line with these findings, students who, in paper I, based their self-efficacy on positive self-perceptions as excellent students received their efficacy information from their general cognitive ability. They emphasized their own responsibility and their strategy was to study alone without asking for help from peers or teachers.

The motive for mastering academic material in many situations is that the knowledge will be needed in the future. If students see that current learning is instrumental for future success, they will be encouraged to master the material (Greene et al., 2004). Self-efficacy differs from other similar constructs as it is more predisposed to the contextual factors and concerns a specific goal. How the academic context is perceived directly influences self-efficacy.

Research in self-efficacy confirms that efficacy beliefs have a strong influence on individual's occupational developments and pursuits, career interests, career aspirations, career-related activities and career performance

(Lent, Hackett, & Brown, 1999; O'Brien, Friedman, Tipton, & Linn, 2000). Individuals with high perceived efficacy as regards satisfying educational requirements and attaining professional positions have been found to have a greater interest in them, prepare themselves better educationally and show greater staying power in their quest for challenging careers (Bandura, 1997; Hackett, 1995; Lent, Brown, & Hackett, 1994). In other words, students' academic self-efficacy and perceptions of their capabilities and skills influence their career aspirations and motivation for developing these capabilities and skills. Previous research has found positive links between perceptions of the relevance of skills and motivation for further learning (Lizzio & Wilson, 2004) between job satisfaction and occupational self-efficacy (Erwins, 2001) and between high academic self-efficacy beliefs and school-to-work transition (Pinquart, Juang, & Silbereisen, 2003). The next section will focus more on transition from education to work.

Transition

> *I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do. Leonardo da Vinci.*

Transition in this thesis is defined as the process from being a student in higher education, through the search of a job as a graduate, to the first months in the new job. Transition as the shift from university life to full-time career employment involves much more than the job search (Perrone & Vickers, 2003). Candy and Crebert (1991) refer to transition as "the interface between higher education and the job market" (p. 570).

Among areas that have been explored in the research on the transition from higher education to the world of work, I have identified three main areas: (a) a system level of transition (*e.g.* Garcia-Aracil, Gabaldon, Mora, & Vila, 2007; Smetherham, 2006), (b) a meso level with a focus on what students must learn in higher education to be prepared for an unknown future (*e.g.* Barnett, 2004; Davies, 2000; Mora, Garcia-Aracil, & Vila, 2007; Perrone & Vickers, 2003; Teichler, 1999). Some of these studies focus on a gap that separates the university and the workplace contexts and give examples of what could be done to minimize this gap to better match students' knowledge and skills to employers' needs (Candy & Crebert, 1991; Graham & McKenzie, 1995). Others focus on forms of cooperation between higher education and the world of work (Boud & Symes, 2000; Reeve & Gallacher, 2005; Smith & Betts, 2000; Teichler, 1999). Related to this is over education, which is explored in many studies (*e.g.* Groot & Massen van den

Brink, 2000; Sicherman, 1991; Schomburg & Teichler, 1993; Teichler, 2000). Graduates' dissatisfaction with being overeducated has been reported by *e.g.* Kaufman and Feldman (2004) and Mora et al. (2007). Finally, (c) the micro level, focuses on how individuals construct their identities in the transition process from being students in a programme to becoming graduates who look for jobs and start working (*e.g.* Ng & Feldman, 2007; Tomlinson, 2007). In this thesis, the focus is predominantly on this latter area.

In a large European longitudinal study, the focus has been on how graduates construe themselves as professionals, or how they experience the transition to the sociocultural contexts of working life (*e.g.* Abrandt Dahlgren, Hult, Dahlgren, Hård af Segerstad, & Johansson, 2006; Johansson, Kopciwicz & Dahlgren, 2008). In this project, transition is viewed as a trajectory between different communities of practice. Abrandt Dahlgren et al. (2006) found that in some programmes, such as engineering, graduates achieve formal legitimacy by successfully graduating from the programme, which is a door opener to the labour market. There was an emphasis on ritual aspects of knowledge and the development of generic problem-solving skills. In a comparison between graduates from Poland and Sweden, Johansson et al. (2008) found that the Swedish graduates expressed more positive views of their future, but that they were concerned about their skills and knowledge in their new jobs.

Dahlgren, Handal, Szkudlarek and Bayer (2007) claim that students in professional programmes in higher education seem to be provided with a discipline-based identity, and that only during the later years in more applied elements of programmes are professional roles developed. Barnett (2004) stresses the importance of self-reliance, flexibility and adaptability, and most studies of transition from higher education to work lend support to Barnett's reasoning that generic skills are an important outcome of the studies.

Methodology

Questions are never indiscreet. Answers sometimes are. Oscar Wilde

In 1998, the board of the Y programme, which is the focus of this thesis, asked researchers at the department of behavioural sciences to investigate the experiences and expectations of first year students in the Y programme. The following year, the board of the programme received extensive grant funding to reform the programme, and decided to develop the investigation of the students' experiences. The purpose of this project was originally to longitudinally explore and describe study-related expectations and

experiences of several cohorts of students during the course of their studies. Respondents in the project were students from cohort 1998, cohort 1999, cohort 2000, and cohort 2002 (Edvardsson Stiwne, 2005). A multi-method design including questionnaires sent to all registered students and interviews with ten selected students from each cohort as well as ten dropouts from cohort 1998 was chosen as the most appropriate data collection technique for the project. By 2004, when students from cohort 1998 started to graduate from the programme, the project was extended to include a final questionnaire and final interviews with the students one year after their graduation, with the purpose of exploring the transition to work of the students and graduates.

Data corpus

All data collected for the entire research project, that is, the data corpus, included seven questionnaires distributed to all students in the four cohorts, interviews with forty students from the four cohorts and interviews with ten dropouts from the programme. The design of the project is shown in Figure 2. It should be noted that there are cases where some students have been interviewed a year later than appears in the Figure, because they took a year of study leave.

All items in the first six questionnaires were developed in order to explore study-related expectations and experiences of students, which was the original purpose of the project. None of these items was taken from any existing inventory. The first questionnaire was distributed to the students in their first semester in the programme and concerned the students' backgrounds and expectations of their studies. The second questionnaire was distributed at the end of their first year in the programme and concerned their experiences of their first semester in the programme. These first two questionnaires were followed up by four questionnaires sent to all registered students in the four cohorts at the beginning of their second, third and fourth year. These questionnaires included mostly the same questions as the second questionnaire (Edvardsson Stiwne, 2005). The items in the seventh questionnaire were developed by the authors of paper IV and Michael Rosander at the Department of Behavioural Sciences and Learning. The purpose of this questionnaire was to explore the experiences of the students and graduates' job search process, of becoming employable and the skills and competences that they needed and used in their jobs as graduated engineers (Edvardsson Stiwne & Jungert, 2007). This final questionnaire was distributed to all students in the four cohorts who had graduated from the programme.

Year Semester	Cohort 98	Cohort 99	Cohort 00	Cohort 02
1998				
autumn	Q1 I1			
1999 spring	Q2 I2			
autumn	Q3	Q1 I1		
2000 spring	I3	Q2 I2		
autumn	Q4	Q3	Q1 I1	
2001 spring	I4	I3	Q2 I2	
autumn	Q5	Q4	Q3	
2002 spring	I5	I4	I3	
autumn	Q6	Q5	Q4	Q1 I1
2003 spring	I6	I5	I4	Q2 I2
autumn		Q6	Q5	Q3
2004 spring	I7	I6	I5	I3
autumn	Q7		Q6	Q4
2005 spring		I7	I6	I4
autumn		Q7		Q5
2006 spring			I7	I5
autumn			Q7	Q6
2007 spring				I6
autumn				
2008 spring				I7
autumn				Q7

Figure 2. Design of the project: Data collection by means of questionnaires (Q) and interviews (I).

At the beginning of the project, many students expressed a worry that their personal responses in the questionnaires would be traced and made public. Accordingly, it was very important for many of the students to be anonymous when filling in the questionnaire. The researchers accepted this request so that students filling in the questionnaires did so anonymously and no questionnaires were coded. Thus, a weakness of the research project is that it is not possible to link a student's responses in one questionnaire to his or her responses in the other questionnaires. Furthermore, questionnaire data cannot be linked to study achievement. In this respect, the questionnaire studies are cross-sectional and not longitudinal.

Individual interviews were carried out with ten students from each cohort. The first interview with each student in each cohort was carried out during their first semester. After this first interview, interviews were carried out in May and June in each semester. In addition to these interviews, there were interviews with four men and four women who dropped out of the programme in February, 1999 (Edvardsson Stiwne, Stiwne, Rosander, Bierberg, & Hagman, 2002).

All interviews were conducted by researchers in the project and graduate students in psychology. In 2004, I had become a PhD student and started to carry out interviews. The interviews were conducted at the department of behavioural sciences and learning except for a few, which were carried out over the phone.

In sampling students to be interviewed, lists of all students who were registered for their first semester were used. The students were listed by class, name, birth registration number and address. From this list, a strategic sample was drawn up in order to have students from all classes and a variation in age and gender. The study board requested that 50 percent of the interviewees be females, in spite of the fact that they made up only between 13 and 20 percent of the entire cohorts. Only the researchers knew who the interviewed students were. The students selected were contacted and informed about the design of the study and asked if they would accept being interviewed. They were also informed that the interviewing would be on a regular basis once a year throughout their entire time as students. Very few students refused to participate and for those who did, there were reserves. The first interviews with cohort 1998 were not recorded or transcribed verbatim. However, when the research project was extended, the subsequent interviews were recorded and transcribed verbatim with permission from the students.

Data sets

The data used in this thesis, that is, the four data sets for the four papers, included the questionnaires and interviews considered to best answer the research questions. The predetermined research questions guided the reading and analysis of the interviews. The focus of the analysis was on the research areas for this thesis. The approaches to qualitative analysis in this thesis were all highly rigorous and time consuming. The positive side of this was that they all helped to produce an insightful analysis that answered the specific research questions. It is imperative to choose a method that is appropriate to the research question, rather than falling victim to 'methodolatry', which is

when a researcher is committed to method rather than content or research questions (Holloway & Todres, 2003).

Data set I

Data

The respondents in paper I were five female and five male students from cohort 2000. The students were aged between 19 and 24 years at the time of the first interview in 2000. At the time of the last interview in 2006, four respondents had recently graduated from the programme, three students were still studying in the programme and had two to three semesters left, and three students had dropped out. In all, 42 interviews were conducted and 410 pages of transcribed material were produced.

Analysis

Interpretative Phenomenological Analysis (IPA) was chosen as the research method for paper I because it is especially appropriate when the aim is to understand something about process and change, which was very important for this paper. IPA is furthermore suitable for analyzing semi-structured interviews when the aim is to explore the insider views of the respondents.

IPA has to date been used mainly in health and psychology disciplines (Reid, Flowers & Larkin, 2005). It relies on an open approach to the interview, and on the assumption that the interviewees are experts on their own experiences. It does not seek to test assumptions, but depends on the emergence of themes as the interview progresses, which was in line with the research questions in paper I.

IPA is influenced by phenomenology. Phenomenology focuses on the exposure of the exclusively subjective aspects of consciousness, entirely free of preconceptions. It has a focus on understanding the meaning and the essences of the experiences of the respondents rather than measurements and explanations (Moustakas, 1994). Without any interpretation, the research tradition of phenomenology seeks to disclose the core nature of conscious experience (Kendler, 2005). Even if IPA is influenced by phenomenology, there is an essential difference between the two methods in the interpretive aspect of IPA. An assumption is that the researcher cannot escape from being intentionally related to the research object. The interpretative nature occurs as the interviewees seek to describe and make sense of their lived experience to themselves and the interviewer. The interviewer must encourage reflection. Hence, the themes described will be the researcher's interpretation of the data, which is obtained from the respondents and concerns their perceptions of reality. Interpretative work by the researcher was necessary in paper I as

the aim was to understand the students' study conditions from their own perspectives.

A step-by-step approach to performing the analysis was carried out in order to find superordinate themes (Smith & Osborn, 2003). When the data had been read in detail several times, it was broken down into meaningful segments in order to decode key words and phrases. This was done on the basis of the theoretical interest guiding the research questions. For example, when students talked about their beliefs in their capabilities, I looked for the word *can*, as in 'I *can* influence for the next year or the year after that', which indicates a judgment of capability, rather than the word *will*, which is a statement of intention, and no indication of self-efficacy. This is in line with Bandura's (1995, 1997) guidelines. The next step involved the search for patterns between themes discovered in order to establish master themes for all respondents. The master themes combine the interpretations of the researcher's and the respondents' descriptions of their experiences and are described in detail and supported with verbatim extracts.

With IPA, the interviewer can more easily uncover what respondents think and feel, and understand the meanings of their accounts. It also facilitates the discovery of rare themes within the area of investigation (Smith & Osborn, 2003). The interpretative part attempts to fit the relationship between the respondents and their contexts into a psychological framework (Larkin, Watts, & Clifton, 2006).

Data set II

Data

In paper II, students from cohort 1999 provide the data. Five female and five male students aged between 19 and 32 years in year 1 were interviewed between 1999 and 2005. In all, 55 interviews were conducted and 485 pages of transcribed material were produced.

Analysis

Thematic analysis of the data was chosen as a methodological approach in paper II. Whereas the purpose of paper I was more theoretically bounded, with the aim of exploring whether students' opportunities to influence their studies had consequences for their study motivation and their self-efficacy, the purpose of paper II was less theoretically bounded. In paper II, the research questions were more open, with the aim of exploring students' perceptions of features of their study conditions that had an impact on their opportunities to influence and control them. Thematic analysis, which is not wedded to any pre-existing theoretical framework (Braun & Clarke, 2006), is

thus more suitable than IPA as an approach for analysing the data in paper II. According to Braun and Clarke (2006), thematic analysis may be considered a foundational method for qualitative analysis. In addition, Boyatzis (1998) describes thematic analysis as a tool to use across different methods rather than a specific method. Being theoretically independent, thematic analysis offers flexibility that may provide rich, detailed as well as complex data accounts.

Thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data. The first step of the thematic analysis was, besides the obvious part of reading the interviews, to establish a set of coding categories to allocate units of meaning of the data (Miles & Huberman, 1994). By means of the coding categories, important characteristics of students' perceptions of their study conditions could be identified. The next two steps were designed to arrange the codes into three inclusive areas: *setting*, *influence*, and *strategy* and to create a systematic filing system for them (Berg, 2001). The final step was to create themes through a thematic analysis of the filing system (Boyatzis, 1998). In this analysis, a theoretical or deductive procedure was employed (*e.g.*, Boyatzis, 1998). I was interested in how students' perceptions of their opportunities to influence their studies played out across the data, and focused on that particular feature when coding the data. The analysis continued until three main themes around perceptions of student influence had been discerned. The themes were analysed in order to detect patterns and changes over time and comparisons between them were made in order to delineate the "deep-structure" and to integrate data into an explanatory framework (Miles & Huberman, 1994). The open-ended approach and the longitudinal design of the study are suitable for a thematic analysis because this method is sensitive to differences in students' perceptions of their study conditions.

Data set III

Data

All cohorts from the data corpus are represented in paper III. The data that were used in this paper were from the third to the fifth questionnaire. The first of the questionnaires was collected by researchers who visited a popular lecture. Students answered the questionnaires during the lecture, and the questionnaires were immediately collected by the researchers. The following two questionnaires were in the form of postal questionnaires with stamped and addressed envelopes, since there were no compulsory lectures including all students of the cohorts after the third year in the programme. One reminder was sent by mail to all registered students. Due to ethical considerations, the questionnaires were not coded and thus the survey data

could only be interpreted on a group/cohort level and comparisons could only be made within and/or between cohorts. No individual trajectories could be traced throughout these data.

The quantitative results of paper III are based on a total of 664 questionnaire answers (see Table 3). Because of incorrect information from the Y programme administrator in 2006 about the actual number of registered students in cohorts 2000 and 2002 at the time of the distribution of the questionnaires, there are differences in Table 3 in the thesis and the corresponding Table in paper III. The correct number of registered students is shown in Table 3 below. The actual response frequency was never below 40 percent.

In the questionnaires, we asked the students about their experiences and perceptions of their studies, their study results, satisfaction with study results, average working hours and perceived workload, study-related health, social isolation, and opportunities to influence their studies, having contact with teachers, and cooperating with other students. All questionnaires are to a large extent identical and contain the same question areas. The only main difference is that the questionnaires concern different years in the programme. Questionnaires 3 to 5 concerned student's experiences and perceptions during years 1 through year 3.

Table 3
Response rates for questionnaires relating to years 2 to 4. Percentages of total number of first registered students is noted in brackets

Cohort	Year 2 (Q3)	Year 3 (Q4)	Year 4 (Q5)
1998	77 (135, 57%)	76 (95, 80%)	62 (83, 75%)
1999	75 (150, 50%)	65 (77, 84%)	43 (72, 60%)
2000	82 (129, 64%)	47 (100, 47%)	39 (89, 44%)
2002	56 (123, 46%)	42 (98, 43%)	-
Total	290 (537, 54%)	230 (479, 48%)	144 (365, 40%)

The response frequency is based on all answered questionnaires in relation to registered students. For the whole material, there is a selection already after the first year in the programme, when many students drop out. In an earlier report (Edvardsson Stiwne, 2005), the reduction was calculated at 20 percent after the first year in the programme.

As the questionnaires were filled in anonymously and not coded, it is only possible to analyse changes over the years on a cohort level. Most of the questions have a Likert-scale design.

Analysis

A large variety of statistical methods were used. The parametric methods used were Factor analysis, ANOVA, and χ^2-tests. Statistical analysis of questionnaire data has been performed using the SPSS 15.0.

Data set IV

Data

In paper IV, students from all four cohorts participated. However, only interview data from students who were interviewed more than four times, and who did not leave the programme, were used because the purpose was to focus on how students related their studies and study conditions to their future as graduated engineers and employees.

In all, the data for paper IV consisted of 112 interviews with 20 students. The interviews were conducted between 1998 and 2007 and resulted in 975 transcribed pages.

Analysis

In paper IV, the goal was not to find patterns or themes, but to explore how students talked about their studies and how they related this to their futures as graduated engineers and employees. A number of questions guided the data analysis. These questions concerned the elements of the programme that students perceived as most relevant and instructive and the skills and competences that students believed would enhance their employability and career opportunities. Interview accounts relevant to these research questions were put together in an order to make it possible to follow how each interviewed student constructed, deconstructed and reconstructed his/her experiences of being a student, of becoming employable and becoming an engineer.

Methodological considerations

For paper II, all interviews with cohort 1999 were chosen because this data set was the most complete in the interview material at the time when I started to analyse interviews with cohort 1999 (the summer of 2005). All interviews of cohort 1998 had not been recorded and transcribed verbatim and I had not personally carried out many of those interviews. Concerning cohort 1999, I had carried out most of the interviews in the spring of 2004 and the spring of 2005. The interviews with cohorts 2000 and 2002 were not complete at that time because more interviews were either still to be transcribed or still to take place with those cohorts the following years.

When I started to analyse the interviews for paper I (the summer of 2006), the data set was complete for the purpose of that paper. Cohort 2000 was chosen for three main reasons. First, cohort 1999 had already been analysed and there was an interest in exploring cohort 2000, who had more experiences of working according to a partly new curriculum. Second, I had personally carried out most of the interviews with students from this cohort (between the spring, 2004, and the spring, 2006). Furthermore, I transcribed all the interviews I had conducted, and this process was, as Bird (2005) notes, a key phase of the data analysis, in which the interpretation started and meanings were created.

Regarding paper III, several reports and conference papers had already explored the first three questionnaires. Thus, I was more concerned with comparing the experiences of all cohorts during their latter participation in the programme. In addition, I had personally distributed many of those questionnaires (beginning as early as in November, 2003) and entered the data in SPSS.

The purpose of paper IV, to explore how students become employable and their transition process from university to work, also guided our choice of data set for this paper. We were only interested in analysing interviews with students who either were about to graduate from the programme or, preferably, had graduated and were working as engineers. Thus, all interviews with students who had dropped out or who were still struggling in the programme with no foreseeable graduation in the immediate future were excluded from this data set. To be able to compare the different cohorts, we decided to interview students from all cohorts.

Several methods of qualitative analysis were considered when the purposes of the papers had been established. Three such methods, which are quite common in the research fields of this thesis, were discarded because they did not fit in with the purpose of the study or because they did not suit the design of the project. For example, the longitudinal design of this thesis makes it possible to explore the development of students' perceptions of their opportunities to influence their studies, their motivation and approaches to their studies as a journey that they experience over time. This journey over time involves a large variety of elements, which makes it too complex to employ a pure phenomenological analysis, where the aim is to uncover an underlying essence. In this thesis, students' perceptions of their opportunities to influence their studies and the development of their motivation is conceptualised more as a process than a phenomenon. A phenomenon is a concept or state-of-being, such as feeling ethnocultural empathy or being gay. In this thesis, the aim was to explore the perceptions of the students'

opportunities to influence their studies. Thus, a phenomenological analysis was discarded.

Grounded theory was not an option either, because such an approach does not allow extensive literature reviews in the early stages of the research to increase the likelihood that the theory will be grounded in data (Cutcliffe, 2000). Creswell (1998) furthermore indicated that theoretical ideas or notions should be set aside in grounded theory. Since I had already undertaken a literature review and setting all theoretical ideas and notions aside was not compatible with my purposes, grounded theory was discarded as an analysis method.

A third method of analysis that could have been considered was phenomenography (Marton, 1981). Phenomenography has been widely used as a research approach in studying learning and teaching in higher education (Entwistle, 1997). The central idea of the phenomenographic approach is to identify and describe students' conceptions of a phenomenon as faithfully as possible. The underlying principle is that such an approach would help the researcher to better understand the outcomes of learning and teaching. However, the purpose of this study is not to study outcomes of but, rather, the conditions of learning. Phenomenography was thus discarded.

Ethical standpoints

Ethical issues permeate the whole research process. There are several ways to look at ethics in research. Gustafsson, Hermerén and Petersson (2006) make a distinction between research ethics and researching ethics. Research ethics concerns how the researcher behaves in relation to the various parties that are affected by the research. Researching ethics concerns honesty in the research.

The parties who are most affected in this thesis are the participating students. Teachers in the programme and even students and teachers in general may indirectly be affected by the results of the thesis. Regarding the relationship between the researcher and the participating students, certain research ethical principals must be raised. There are four general principles: (a) information requirements, (b) consent requirements, (c) confidentiality requirements and (d) usage requirements (cf. Vetenskapsrådet, 1999). The first requirement concerns how detailed the information about the research project given to the students must be so that they will have sufficient information to make a reasonable judgement as to whether they want to participate without risking weakening the research. In this thesis, there are no elements that would have involved deceiving the respondents. During the very first encounter, all students were informed about the purpose of the study and how the research results would be used. During each data

collection, all the students were informed about the purpose of the study in general terms so that the opportunity to explore a wide range of areas would not be prevented. By giving the respondents sufficient information, they could make a judgement to decide to participate in the study. All students were fully aware that their participation was voluntary. The drop in the number of respondents in the interviews was marginal, although it was fair high at the later stage of the questionnaire study. There is a risk that the drop in the number of responses was systematic and could result in a bias in the results. The question then is whether the results of those questionnaires will give a fair picture of the students and if those results are representative of the students in the programme. The confidentiality requirements were met as all information concerning the interviewed students was treated confidentially and only members of the research project knew who they were. When the last interviews in each cohort were carried out, there were some cases where some respondents were the only female students with a specific specialisation. In those cases, interpretations and presentations of the results required a certain degree of care. Even teachers were sometimes indirectly affected by the results of interviews as well as questionnaires. All students and teachers in the questionnaire study were totally anonymous. The usage requirement primarily concerns how the programme board may use the results of the thesis to reform the programme.

Concerning researching ethics, good and honest research means that (a) the method will reliably answer the research questions, and (b) that the questions are worth answering (Gustafsson et al., 2006). Both criteria are met in this thesis.

Regarding the first criterion, multiple methods are used longitudinally to explore the perceptions and experiences of the students. Unfortunately, there is a shortcoming as to the method in the questionnaire study. The participating students wanted to be fully anonymous in that study and as a result, no answer in the first questionnaire can be followed up in later questionnaires and no conclusions can be drawn if students change on an individual level; only on a group level.

Regarding the second criteria, the thesis has a value and is relevant. Results from the study may increase our knowledge of consequences that students' views of their perceptions of their opportunities to influence their study conditions have for their study motivation and study approaches. The board of the programme could use the results in order to facilitate the study motivation and study approaches of the students and increase the knowledge of what students perceive as relevant and valuable courses in the programme.

Finally, the research project that this thesis is part of can be regarded as action research. It was the board of the Y programme that asked researchers

at the Department of Behavioural Sciences to investigate the experiences and expectations of first-year students in the programme. The aim of the board was initially to obtain information about the students, which in the long run could help the board increase the number of graduated students from the programme. The board was also the principal financier of the project. This arrangement could have resulted in ethical problems. However, the board of the programme receives information about experiences of the students in reports, while I as a PhD student could freely choose what I wanted to focus on in my thesis. Throughout the writing of my thesis, I focused on doing research of high quality that I was interested in. Of course, I had to be careful that the results from the reports and the results from my papers were not contradictory. Both reports on the project and papers in this thesis have been reviewed by me and by the project leader Dr. Edvardsson Stiwne. Consequently, I am confident that there are no significant contradictions.

Reliability and Validity

The reason for using qualitative methods in articles I, II, and IV was to derive rich and deep data that contribute to the research on student motivation and self-efficacy, their strategic approach to studying, and transition. However, there is a critical issue regarding the generalisability of qualitative research. In this thesis, it is assumed that the most important criterion for assessing the study is its relevance to the theoretical framework (see e.g. Guba & Lincoln, 1994). Generalisability involves much more than proving causality of random samples. The generalisability of the qualitative results of this study is increased because of what Schofield (2002) refers to as contextual similarity of the respondents in the study and of engineering students in similar settings. Implications of the general findings can be generalized to all high-demand programmes in engineering with a similar context. There is reason to believe that the MSc programmes in engineering in Sweden are all very similar. Special interest organisations, such as the Swedish Association of Graduate Engineers, have been bodies to which proposed measures are referred for consideration when these programmes have been developed and reformed (e.g. Industrikommittén, 2006; Sveriges Civilingenjörsförbund, 2006; Sveriges Ingenjörer, 2007). The impact of their views on the programmes is visible in the characteristics of all Swedish MSc programmes in engineering, e.g. they require the same knowledge entrance requirements, they have similar introduction courses in mathematics distinguished by high demands and heavy workloads and, until 2007, they were all 4.5 years long. Finally, generalisability can be attained through recognition of a common gestalt (Larsson, 2005). Generalization by recognizing a gestalt or, as in two of the examples in this thesis, students' perceptions of their opportunities to

influence their study conditions and how this is related to their motivation and study strategies, can occur although the context of other programmes is in many ways different from the original study. The results of this study show that qualitative analyses of longitudinal, semi-structured interviews contribute to the empirical research in this field.

The response frequencies of the questionnaires fell in the later questionnaires. One reason for the lower response rate could be that students who had the questionnaires distributed to their homes were not as inclined to return completed questionnaires as students in the lecture hall. Accordingly, there is a risk that the drop in the number of responses is systematic and may result in a bias in the results. One hypothesis is that students who answered the questionnaires differ from students who chose not to do so. The heterogeneity amongst the cohorts therefore decreases over time and students who answered the questionnaires are more homogenous over time, and the results to a great extent refer to 'the successful' students. When missing data are random and the percentage of missing data per variable is rather low while distribution is normal, missing values may be imputed by the use of the EM algorithm (Tabachnick & Fidell, 2001). However, it was difficult to decide how much of the data were systematic and how much were random in this case, and, therefore, no imputation was made. It was furthermore not possible to know if a certain category of students did not fill in the questionnaires since they were all answered anonymously, which of course is a limitation of the questionnaire study.

Results

L'ennui est entré dans le monde par la paresse. Jean de La Bruyère.

Paper I

Three comprehensive areas, which students described as significant for their studies - setting, influence, and strategy – were obtained.

Setting comprises students' broad perceptions of their study conditions. The programme was a challenge and students expected tough conditions and were prepared to work hard. As freshmen, students adapted to a new life, which was more demanding and involved a heavier workload than they were used to. Students did not feel that they got much encouragement from lecturers. In the third year, there was a peak of hard work. High academic self-efficacy convinced the students that they could manage both highly demanding courses and time-consuming activities during the semesters of the first three years. During the last year, the pace was more moderate. Students

chose specialisation courses and studied in smaller groups. They appreciated the freedom to think and reflect on problems, especially in their Masters thesis.

Influence concerns how students perceived the opportunity of influencing their study conditions. This could be (a) directly through course evaluations, (b) indirectly by making choices such as when, where and with whom to study, and when to retake failed exams, and (c) by creating a dialogue with faculty, for example, by asking for and receiving help from teachers. Students seldom individually tried to influence teachers, but were confident that it could help and that the programme could be improved by means of class evaluations and class representatives. In the first year, the perceptions ranged from acceptance of the heavy workload, changing the curriculum, asking teachers to adapt their approaches to student demands, to how to cooperate with peers. In the second and third year, students found it more difficult to get help from teachers than they had anticipated, and felt that course evaluations only led to changes that affected later cohorts. Thus, more indirect ways of influencing were emphasized, such as choosing course assistants and peers to study with. During the final two years, in the smaller groups in the specialisation courses, students felt that they had more dialogue and cooperation with peers and teachers and a greater ability to influence by interaction. Students felt that they had many opportunities to influence their Masters thesis.

Students' opportunities to influence their study conditions were enacted in various *strategies*, such as routinely using class representatives and course evaluations in the first year. By the second and third year, they doubted that it could help them. The students were self-regulated learners and good at planning, prioritizing and staying focused, which helped them get time for exercise or relaxation. Students had different strategies for getting feedback on their work. Students who based their self-efficacy on positive self-perceptions as excellent students received their efficacy information from their general cognitive ability and tried to figure out problems on their own. Students who wanted to increase their perception of informal opportunities to influence their studies often asked teachers or peers for feedback. The programme was considered flexible since courses could be taken in an order that suited individual needs. Students could thus be involved in extracurricular activities, which gave some of them a sense of autonomy, thus facilitating their intrinsic motivation. From the spring semester of the third year, students could attend all lectures and lessons and more often interacted with teachers and took control of their studies. Students with both social and academic commitments were the most persistent and motivated, which supports findings by Tinto (1997).

Paper II

Three approaches to studying – adaptive, critical and cooperative – emerged when each area was thematically analysed. Each approach involves different ways of perceiving the study conditions, and the opportunities to influence them, and different strategies for gaining control over study conditions. These approaches are not categories of students.

The adaptive approach was based on the perception that the programme was supposed to be demanding and that students should accept and adapt to the conditions of the programme. Students' main interests were to acquire new knowledge and that precious time should be devoted to studying rather than trying to influence the programme. Students accepted receiving only exam results as feedback. Students, who perceived the programme as an ideal one and faculty as "expert" authorities, adopted an adaptive approach as well as having great respect for the programme. They thought it was wrong to change a concept that had worked well for several years. This respect reduced their desire to influence or change the programme and made them work harder to prove that they were worthy of the programme. Personal responsibility was central to their learning,

They identified themselves with a difficult elite education, which they were proud to take part in. They looked for challenges allowing them to "push the limits". In the final years, this approach resulted in students being more disappointed with the lack of feedback and encouragement. It was also believed that the quality of the programme could be improved if students tried to exert an influence in certain ways. There was also a regret at having missed opportunities to learn how to cooperate with other people and to build networks.

The critical approach was based on a critical approach towards the study conditions and the perception that difficult conditions were negative because they made it hard to reflect on what was studied. In this approach, students tried to improve the programme through course evaluations, trying to influence teachers, choosing course assistants, and creating individual curricula that allowed more time for self-instruction. Feedback and committed and encouraging teachers were important for students' learning. The importance of finding peers at the same level to work with was also emphasized. Cooperation with a friend gave a sense of control.

Having to study several courses in parallel was perceived as negative, so students created individual curricula to take control of their workload, which facilitated studying at a more moderate rate. In an individual curriculum, courses were taken in an order that suited individual needs, *e.g.* only studying some courses or the easier courses, and deciding how much time to spend on

lessons, lectures and self-study. Over time, this strategy became more common. A related strategy was the option to take study breaks. Choosing course assistants could improve students' perceptions of their capacity to influence and control their study conditions, creating a positive cycle; more response from the course assistant increased deep-level learning, and increasing the potential to help peers resulted in more self-esteem, so that they dared to ask the "basic" questions, and this then increased their learning even more.

The cooperative approach was based on the perception that cooperation with peers is the most important way of influencing their conditions and that the programme was a challenge. Cooperating with peers was a strategy used to exert influence and gain control over the study conditions, and to increase their learning. In the second year, it was mentioned that teachers' feedback was often on too high and abstract a level; students preferred discussing problems with peer students and by helping them. In the first two years, this approach resulted in students structuring their lives according to the courses. They spent most of their time on campus, attended most lectures and lessons, and studied with any classmate who wanted to cooperate. Peers were necessary for social support and for creating a balance between academic and social goals. In the long run, cooperative strategies seemed to facilitate a sense of control in the students.

One emerging theme was that, over time, when external demands changed, strategies changed too. The adaptive approach led to more interaction with peers and faculty. The critical approach led to more participation in lessons and investments in studying in specialisation courses. The cooperative approach led to more prioritizing.

Paper III

In paper III, questionnaires were used to explore student experiences in several study-related areas. Results show that over time, more students were satisfied with their studies. One explanation could be that students choose study profiles, which they study to a large extent in their fourth year. It is possible that these courses were perceived as more relevant and interesting, which increased their satisfaction. The hypothesis that there has been self-selection among students who have replied the questionnaires is also a possible explanation. If you are successful, you are usually satisfied.

The third year in the programme involved the highest demands in terms of working hours per week and perceived workload for cohorts 1998 to 2000. The results indicate that the percentage of students who worked more than 40 hours per week and who perceived the workload as very heavy or

overwhelming was the largest in these cohorts in year three. For cohort 2002, a different pattern developed. They spent the least time on their studies during the second and third year and had a higher percentage of students who studied less than 40 hours per week than the other cohorts. Significantly fewer students from cohort 2002 than expected perceived the workload as very high or overwhelming. In cohort 2000, 47 percent of students experienced a very high or overwhelming workload, but only 18 percent of students in cohort 2002 did the same.

In the questionnaires, there are general questions about health and ill-health as well as more specific questions about complaints that may be related to the context of higher education in a more general sense than solely their study conditions. For the general questions about health, a factor analysis resulted in a bipolar scale, which covers the following poles: (a) 'My health is good', (b) 'I enjoy the place of study', and (c) 'The studies have affected my health in a negative way', (d) 'I have felt that I do not really fit in the programme', (e) 'I have experienced feelings of social isolation'. The factor can be called *Health and ill health*. On average, all cohorts of students experienced more health than ill health. No significant differences between the cohorts were found.

Feelings of social isolation may be related both to the situation and relationships. A student may, for example, have many relationships outside the university and have problems feeling at home in the academic world and as regards relationships, *e.g.* a student may find it difficult to establish contact with other students. In both cases, there may be a dominant feeling of not really fitting in. The percentage of students in cohort 2002 who had such feelings decreased slightly from 37 percent (see Edvardsson Stiwne, 2005) to 33 percent, and then remained on that level. For the other cohorts, the percentage increased from similar or higher levels to a level much higher in their third year. Cohort 1998 experienced social isolation to a greater extent than all other cohorts during the third and fourth year. A χ^2-test indicated that cohort 1998 experienced significantly more social isolation and cohort 2002 experienced less social isolation than could be expected in the third year[3].

Applying a factor analysis, the questionnaire statements of influence and cooperation were reduced to two factors that can be called *Influence and contacts with teachers* and *Cooperation with other students*. These two factors explain 30 and 54 percent, respectively, of the variance. Regarding students' experienced opportunities to influence and cooperate with teachers, these opportunities were relatively high, ranging between 2.9 and 3.3. The results indicate that students in cohorts 2000 and 2002 had better cooperation

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[3] χ^2 (3, $N = 227$) = 9.0, $p < .05$

opportunities with peers than students in the other cohorts. An analysis of variance for cooperation showed a significant difference. Cohort 2002 experienced their opportunities to cooperate with other students as significantly better than cohort 1999[4].

Paper IV

Five areas were highlighted: (a) plans for the future or ad hoc constructions of job opportunities; (b) course content, curricular design and career plans; (c) the job search process: an active search or an ambivalent monitoring of opportunities; (d) becoming an employee, becoming employable, and (e) on the job: job satisfaction – life satisfaction, plans for the future. There were differences in the way students talked about these issues during the time they were studying, when they were looking for jobs and thinking of their future roles as employees, and when they were employed and were working.

Throughout the interviews, certain turning points were identified, where the students had to make various decisions, and they thus deconstructed and reconstructed their experiences of being students and graduates. When students enrolled in the programme, very few had any idea about what an engineer was or what engineers did. They had no articulated career plans, with the exception of mature students who saw further education as a way out of unqualified work. During the first three years in the programme, the students' lack of career plans for the future was enacted in different ways; some students engaged primarily in activities aimed at confirming their position as an engineering student and involved themselves in student union activities and extracurricular activities, others viewed the programme as one option among others and, finally, some focused on a specific subject of interest, and on the reputation of the programme.

Choosing a profile was a crucial point. Three different strategies prevailed: (a) students who had experienced an overwhelming workload chose the options of exit or taking some time off studies and deciding either to drop out of the programme or to take study leave to think things over, (b) to stay on and deepen an interest with no consideration of a future job or career, or (c) to stay on and make choices that will be considered paths leading to a job.

Starting to look for a placement for their graduate thesis/project was another crucial decision point. Many students argued that doing a thesis project in a company was the best learning experience during all their studies because generic skills and cultural values are best learned in extra-curricular

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[4] $F = 3.82, p < .05$

activities and in work contexts. Furthermore, most students were convinced that a good placement would provide contacts that would result in a job after graduation. When writing their thesis, students became aware of their employability skills and that autonomy, opportunities to influence personal work conditions and time management were quite different than in their study conditions.

The motivation to take the step from being a student into working life varied amongst students, within as well as between cohorts, due to their individual goals as well as the job market situation at the time of graduation. The skills and competencies that seemed to the students to be of most value in the *job search process* were: a good thesis project; a diploma from the programme proving that they were able to manage a tough programme and to manage a heavy workload; self-efficacy, knowing that they could solve complex problems and that they possessed a broad knowledge base. The reputation of the programme was also mentioned as being a core value of the programme.

In cohorts 2000/2002, all the students interviewed except one were eventually employed at the place where they had carried out their graduate project. Many students experienced the step from being a student at the university to becoming a graduate project student in a company, as being bigger than the step from being a graduate student to becoming an employee. Mathematics and subject-specific knowledge, problem-solving skills, time-management skills, learning skills, and an ability to manage stress and heavy workloads were recognized as key acquired skills.

Discussion

The focus of this thesis is on four cohorts of engineering students and their experiences and perceptions of their studies and transition to work. The research field of this thesis is complex. The theoretical areas that are explored are areas in their own right, but are also linked to each other in many ways. In addition, the development over time, which permeates the whole thesis, contributes to the complexity. However, it is possible to unite the social cognitive perspective with the perspective on approaches to studying. Figure 3, the conceptual model of opportunities to influence study conditions and transition to work, which is inspired by the Entwistle and Smith conceptual model of the teaching-learning process in higher education (2002), shows how the different parts of the theoretical models and various parts of this thesis are integrated.

The conceptual model of opportunities to influence study conditions and transition to work (Figure 3) has a student and graduate perspective. Student characteristics refer to students' perceived intrinsic motivation, external regulation and self-efficacy beliefs. The approaches to studying predominantly refer to the adaptive, critical and cooperative approaches to studying of paper II, but may in addition refer to a strategic approach to studying. The study conditions concern how students perceive, for example, their workload, teacher feedback and cooperation, but also the opportunities to influence the study conditions that are available to Swedish MSc students (*e.g.* course evaluations and student representatives). However, some of these parts, such as student representatives, may be characteristic of Swedish students and could be replaced by more general opportunities to influence the study conditions for the model to be generalised to a greater population of students.

Transition in the model is the link between being a student in higher education, through the job search process as a graduate, to a job. The transition characteristics have the perspective of the student and graduate, and concern the students' and graduates' career plans, knowledge and skills. A model with another perspective could have quite different transition characteristics. The same pertains to the transition environment, which in this model refers to the environmental opportunities to make decisions and to the choices that students and graduates make, which are usually important for them to become employable and make a career. When students make the various decisions, such as what profile to choose and where to do their project/thesis, they deconstruct and reconstruct their experiences of being students and graduates. This is also emphasised in the model. It should be noted that student characteristics also are important in the transition and play an essential role in the graduates' job search process.

The present thesis suggests that students' perceptions of their opportunities to influence their studies are related to a number of variables, and that their perceptions vary over time. In line with the findings of Entwistle (2001), the approaches to studying and the various strategies of the students in this thesis are elicited by the content of the tasks and the study conditions.

There is an attempt to show both variations in each approach to studying and to consider the nature of the object of study for the individual students. Although different approaches and strategies were used on different occasions, it was clear that, just as students have general tendencies to adopt particular approaches to learning (Ramsden, 1992) they also have general tendencies to adopt particular approaches to gain influence and control over their study conditions.
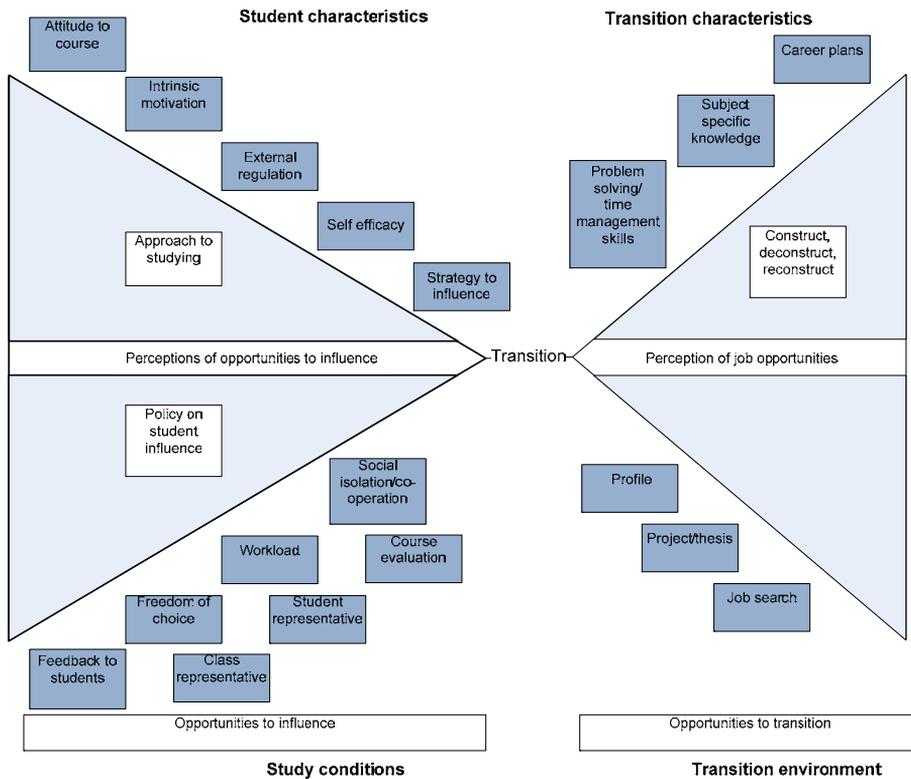
Figure 3. Conceptual model of opportunities to influence study conditions and transition to work.

Each approach to studying can to some extent be stable – as a habitual response to learning situations, which a student commonly encounters – and yet also variable in response to the conditions and assessment demands in a specific course. Most students had general tendencies to adopt a specific approach. However, a few students adopted the same approach to studying throughout the course of their studies, and seemed to almost identify themselves with that approach, whereas other students could manifest a critical approach, when they described their perceptions and their studying in one interview, and a cooperative approach in another interview. This variation clearly shows that the approaches depended on the shifting study conditions and on how the students perceived them.

One of the most important contributions of this thesis is that students' opportunities to influence their study conditions should be integrated in the conceptual model of the teaching–learning process in higher education that Entwistle and Smith (2002) have developed. How students perceive their

opportunities to influence and how they act in order to control their studies affect all three parts of the model. In this thesis, the focus is on the student characteristics, the study conditions and the transition to work (Figure 3). Influencing the studies involves choices students make in which they exert power in controlling and influencing their study conditions. Students can choose to use statutory, formal and informal forms of influencing. All these forms of influencing can have an effect on study conditions, which in Entwistle and Smith's model are called departmental characteristics. Study conditions that students may try to influence can be workload, course design, teachers' feedback to students and assessments. For example, students may try to influence the teachers so that they give thorough explanations regarding subject matter, give the highest quality feedback on student work and encourage autonomy. They may also try to influence the design of the curriculum so that the workload is less heavy. Both the study conditions that may be influenced and the forms of influencing that students can use to change the conditions are included in the model.

Within a specific approach to studying, students may give different priorities to their various features and strategies. For example, a critical approach to studying may have an emphasis on the importance of encouraging teachers who give useful feedback. However, in other situations, the critical approach to studying may involve an emphasis on achieving a balanced life for the student, *e.g.* by only doing two out of three courses during particularly demanding semesters. The approaches that students employ in order to influence and take control over their study conditions involve several strategies. These strategies can be either conscious, under the students' control or used implicitly without much reflection or control.

There are, furthermore, links between students' approaches to their studies and their perceptions of their opportunities to influence their study conditions. A large number of students in the interviews (paper I and II) believed in their statutory opportunities to influence their studies. However, there was variation regarding how much students believed that their opportunities to influence the studies actually could result in improvements in the programme. There was a greater variation regarding perceptions of informal opportunities to influence the studies. In the quantitative study (paper III), students in all cohorts believed in their opportunities to influence their studies. The problem with the quantitative results is that it is not possible to know how students interpreted the survey questions about influencing. They may have interpreted the meaning of influencing as statutory, formal or informal, which has been elaborated in a later study (Jungert & Rosander, 2009). How students relate to their opportunities to influence their study conditions is linked to the students' characteristics, *e.g.*

their study motivation, self-efficacy, and approach to studying. Students' different perceptions of what responsibility they have for their own learning and how to gain a sense of control seem to lead to different perceptions of the conditions in terms of workload, teacher feedback and cooperation with peers. As a consequence, students adopted different strategies throughout the programme in order to manage the workload, create feedback and solve problems.

The findings in this thesis indicate that students with different approaches to studying have different views of conventional teaching and project-based courses. Depending on their approach to studying, they are motivated in different ways when studying in a conventional course and when they study in project-based courses. A student who adopts e.g. an adaptive approach to studying emphasizes personal responsibility when studying, and would be more motivated to study in conventional courses dominated by self-studies. A student who adopts a critical approach to studying would be more motivated to study in a project-based course because such a course involves good opportunities to influence the amount of teacher feedback, how to structure the studies and what parts of a course to focus on. A student who adopts a cooperative approach would also be more motivated to study in project-based courses because it would involve more collaboration with peer students. Thus, students with a preference for adopting an adaptive approach to studying would be more likely to enrol in a programme with conventional teaching, whereas students with a preference for adopting a critical or cooperative approach to studying would be more likely to enrol in programmes with project-based courses. The programme was marketed as a highly demanding programme with many conventional courses prior to 2000 and as a programme with project-based courses from 2000 and onwards. One consequence may be that there were different cultures in the cohorts – more students with an adaptive approach in cohorts 1998/1999 than in cohorts 2000/2002, while students who adopted a cooperative and a critical approach were probably more common in cohorts 2000 and 2002.

In many models of student approaches to learning, self-efficacy is omitted. Self-efficacy is, however, closely tied to performance, learning and achievement (Bandura, 1997; Pintrich, 2000b; Pintrich & Schunk, 2002). In the model introduced on page 39, self-efficacy of students is an important student characteristic that is linked to students' perceptions of opportunities to influence their study conditions. In addition, study motivation has been elaborated because it is such a complex term. Thus, the distinction between self-determined and controlled sorts of intentional regulation is clear in the model, i.e. intrinsic motivation and external regulation.

Bandura and Wood (1989) emphasised the significance of personal efficacy to effect change. Human behaviour is governed largely by perceptions of personal efficacy and social environments rather than simply by their objective properties. Individuals who believe that they are inefficacious usually only achieve limited change even in environments that provide many opportunities. On the other hand, individuals who have high beliefs in their efficacy, discover ways of exercising some measure of control when conditions offer limited opportunities and many constraints (Bandura & Wood, 1989). The results of paper I lend support to this notion. Even if all students in the programme had the same formal opportunities to influence their studies, there were differences in how they perceived their opportunities as well as the strategies for influencing their study conditions they developed. Students who believed in their opportunities to influence their studies managed to exercise more control and influence by means of strategies that included a greater variation in forms of influencing (statutory, formal and informal forms). Students with a lower belief in their opportunities to influence their studies had more problems both in perceiving and using their opportunities to influence their study conditions. The results indicate that students who had a high belief in academic self-efficacy could have both a high and a low belief in their opportunities to influence their studies. Having a high academic belief but a low influencing belief resulted in the use of formal opportunities to influence but not in informal opportunities to influence, while students who had a high belief in their opportunities to influence their studies used a greater variety of strategies to influence their studies.

Stability of self-efficacy beliefs has, according to Bong and Skaalvik (2003), hardly been examined. However, the longitudinal design of the data collection in this thesis made it possible to study how the self-efficacy and study motivation of students changed throughout the programme. The results lend support to the notion that self-efficacy is a context-specific construct, but that self-efficacy beliefs of many students were rather stable over time. Few students expressed decreases in their self-efficacy beliefs as a result of perceiving themselves as average or below average students in the programme. Students estimate their confidence in success in comparison with goals and standards and do not engage in active social comparisons when assessing their self-efficacy beliefs. Instead, they calculate their chances of successfully performing at designated levels (Bong & Skaalvik, 2003; Schunk, 1991). On the other hand, social comparison is a powerful source for judging self-concept (Marsh, 1993). This may explain why many students interviewed in this thesis felt both that they were not among the high achievers in the programme and that they could maintain a high belief in self-

efficacy. They gauged their efficacy beliefs against goals and not social comparisons.

In line with earlier research (*e.g.* Pintrich, 2004), students flexibly combine different goals and strategies in various ways depending on their study conditions. Self-regulated learning models allow students to have multiple goals and there are differences in the links between goals and strategies. For example, students could have the goal of achieving well, of feeling that they are in control, of having a good balance between their studies and their social lives and their personal interest in the courses. Furthermore, as shown in paper IV, few students had clear professional goals when entering the programme, even if there was variation throughout their years in the programme.

Results from this thesis show that different approaches to studying and influencing study conditions are linked to different kinds of goals. One of the goals of students who adopt an adaptive approach to their studies, may have to do with how to prove to themselves that one can manage highly demanding studies and heavy workloads, whereas students who adopt a critical approach to studying may have a goal that includes various opportunities to influence the study conditions to feel in control. Hence, the different approaches to studying are related to different forms of motivation. Many students who adopt an adaptive approach to their studies seem to be intrinsically motivated to do well in most courses. Students who adopt an adaptive approach to their studies may also adapt to the demanding conditions and study very hard in order to enhance or maintain the feeling of worth and high self-efficacy. In such cases, they are extrinsically motivated by what is called introjected regulation (the drive to preserve a self-image). This is a type of regulation that is still quite controlling because the student feels pressure to attain ego-enhancement or pride. During especially demanding times, students with a critical approach often chose to take some courses and drop others. In the courses they prioritised, they were either intrinsically motivated or driven by identified regulation, because they recognized the value of learning for their own goals. Regarding courses that they dropped, they were extrinsically motivated and eventually took them in order to be able to graduate. It is more difficult to tell what kind of motivations that drive students who adopt a cooperative approach to study. The cooperative approach has similarities with the adaptive approach in the emphasis on the responsibility of the student. However, students who adopt such an approach deal with the demanding and challenging programme by cooperating with peers. When they study, they may be driven by intrinsic motives as well as by introjected regulation where they strive to attain feelings of worth and pride in front of their peers. When they chose profiles

at the end of their studies, they often chose strategically. This indicated that they were then driven by identified regulation because they had identified with the value of having a specific profile. In other words, there were shifts from an intrinsic to an external orientation of the students' motivation. In previous research, Deci and Ryan (2000) have found that behaviour could begin by being externally regulated but later becomes intrinsic if the person feels that the activity is intrinsically interesting. Thus, both kinds of orientation shifts may occur for students, which makes it rather complex.

In the model introduced on page 39, there is a link to the transition process. The model shows elements and characteristics that are important in the transition process, such as the students' plans for the future, their acquired skills and knowledge that are important in the job search process and on the job and significant choices students make in the course of their studies, such as choice of profile and choice of placement for their thesis/project.

A theme that is explored in all the papers is the students' perception of their workload. When this theme is developed, there are many interesting links between how students perceive their study conditions and their opportunities to influence their studies and variables such as approach to studying, self-efficacy and motivation.

In the third year, most students estimate that they work more than 40 hours per week, and more students feel that they have much heavier workloads than during their earlier years in the programme. Questionnaire results show that the percentage of students who work more than 40 hours per week and who feel that they have very heavy workloads is significantly larger for cohorts 1998 and 1999 than for cohorts 2000 and 2002. The interviews showed that the workload peaked in the third year in the programme, but did not indicate whether students in cohort 1999 experienced heavier workloads than cohort 2000 or not. On the other hand, the qualitative studies of cohorts 1999 and 2000 show that the perception of the workload is associated with the approach to studying, the level of self-efficacy and the type of study motivation of the students. Students who adopt an adaptive approach to studying accepted heavy workloads, and would probably not perceive workloads as overwhelming. Students who adopt a critical approach to studying would not accept too heavy workloads, and might even be more sensitive to heavy workloads. Even if students who adopt a cooperative approach to studying may perceive the workload as heavy, they did not talk much about overwhelming workloads in the interviews. Normal-achieving students perceived the workload as heavier than high-achieving students.

There is, furthermore, the possibility that the reformation of the programme, which included the introduction of several project-based courses, is also associated with how workload is perceived. Project-based courses

allow students to design their own projects, to decide how to plan and organize a project and to collaborate in project groups. All these elements of project-based learning offer students more autonomy and responsibility, which may provide them with more opportunities for control and influence over their study conditions than in conventional courses. This can reduce the perception of heavy workloads if students plan and organize their studies in effective ways. When students feel that they can take more study-related decisions on their own, their sense of autonomy may increase. A sense of autonomy often facilitates intrinsic motivation (Ryan & Deci, 2000). However, it may take some time for students to adjust to the new features of studying that project courses involve. This may explain why cohort 2000, who worked in their first projects in their third year, felt that they had significantly heavier workloads than cohort 2002. Cohort 2000 was not used to features such as handling deadlines and documenting. Hence, they perceived the workload as heavier than cohort 2002 who were used to studying in projects from their first year, and in their third year knew how to treat the frames and how to work according to the project model LIPS (i.e. the Lightly Interactive Project Management Model), which has been developed at Linköping University. However, the results of paper III indicate that both cohort 2000 and 2002 felt that they had better opportunities to cooperate with peers than students in the other cohorts. This indicates that even if cohort 2000 experienced heavier workloads than cohort 2002, the project and team-based learning approach had as positive an effect on their cooperation with peer students as for cohort 2002. An alternative interpretation of the result that the later cohorts perceived their cooperation with peer students as better than the earlier cohorts could be that they had different social climates. Cohorts 2000 and 2002 may have had a social climate that allowed for better cooperation. It is furthermore possible that the reforms of the programme promoted a social climate that allowed for more cooperation than the social climate of cohort 1998 and 1999.

Average students, as well as students who adopt a critical approach to studying, focused on reducing the workload and demands in order to achieve a sense of autonomy, increasing study motivation and opportunities to reflect upon their studies. High-achieving students as well as students who adopt an adaptive approach to studying did not focus on reducing their workload. It is possible that the average students and students who adopt a critical approach to their studies perceive very heavy workloads as a threat. Too heavy workloads would be a threat to their opportunities to reflect upon their studying and to learn in depth the study material, even if they had a great belief in their capability to eventually graduate from the programme. On the other hand, high achieving students and students who adopt an adaptive or a

cooperative approach to their studies perceive heavy workloads as a challenge. This would be consistent with previous research showing that persons with high self-efficacy beliefs evaluate demands as a challenge whereas persons with low self-efficacy beliefs evaluate demands as a threat (Jerusalem & Schwarzer, 1992; Pintrich & De Groot, 1990).

In paper IV, three different strategies prevailed when students chose their profiles. Students with the first strategy, who decided either to drop out of the programme or to take a study leave to think things over, can be compared to the low achieving students in paper I and to students who adopted a critical approach in paper III. Students with the second strategy, staying on and deepening an interest with no consideration for a future job or career, show similarities with high achievers in paper I and especially with students who adopted an adaptive approach in paper II. Finally, students with the third strategy, staying on and making choices considered paths leading to a job, show similarities with students in paper II who adopted a cooperative approach.

In paper IV, most graduated students emphasised their generic skills as more valuable than subject-related knowledge in their job search process and in their jobs. Examples of such generic skills are problem solving, planning and being able to master heavy workloads. This is in line with findings by Knight and Yorke (2004) and is probably a result of the general disciplines of the programme. As was shown in Paper I, most students emphasised the importance of what they referred to as the trademark of the programme. The trademark of the programme was the ritual aspects of knowledge (Abrandt Dahlgren et al. 2006) such as the intensity of the studies and the high workload. When students adapt to this sort of study conditions, they are forced to learn generic skills such as managing heavy workloads. Students want to retain the trademark of the programme as it gives them a formal legitimacy as a door opener to the labour market. Students who adopt an adaptive or a cooperative approach will probably focus more on developing such skills, whereas someone who adopts a critical approach will try to change his/her focus to other aspects. Another reason for the importance of the generic skills is probably that the Y programme is a broad education programme and that many graduates specialise when they enter working life rather than while being students in the programme.

To conclude, this thesis contributes to research on how students perceive their study conditions. The findings indicate that students' perceptions of their opportunities to influence their study conditions interact with their motivation, self-efficacy and approaches to studying.

Credibility

Criteria of judgement are based on the detailed elements of the actual strategies used for collecting, coding, analysing, and presenting data. All qualitative analyses have been tested until the final results are presented. The theories that have been developed in this thesis, such as the approaches to studying, the relationships between students' perceptions of their opportunities to influences their study conditions and their study motivation and self-efficacy and their experiences of becoming employable, did not only emerge by encountering students and interviewing them, but also as a result of reflection and in-depth analysis. Of course, these analyses are not the only credible ones, but they are the fruits of a systematic ordering of several rigorous analyses, which Glaser and Strauss (1967) argue is highly important for conveying credibility.

By giving a quite detailed description of the context of the study conditions, where the programme and the life of the students is described, the reader can literally understand what students perceive and experience. The results of the analyses are, however, written in general form and related to the theoretical framework of the study, which may result in them seeming rather abstract. Glaser and Strauss (1967) write that readers go through a discounting process whereby they make necessary corrections and adjustments when thinking about the theory.

For a long time, quantitative methods have dominated when exploring the concepts discussed in this study. In the case of self-efficacy and motivation, a sociocognitive perspective has dominated and, as a consequence, standardized assessments and survey research methods have been encouraged. Furthermore, most studies of self-efficacy and motivation focus only on the relationship between the student and the teacher and have been carried out in the classroom. Approaches to studying have been explored by using a number of different instruments, such as *Approaches to Studying Inventory* (ASI). These methods have many important advantages, but have at the same time been criticized. For example, Maehr and Meyer (1997) argue that in motivation research, these methods may have biased and limited conceptions of motivation. Greasly and Ashworth (2007) argue that, even if the ASI is complex and Entwistle has greatly elaborated approaches to studying (e.g. 2000, 2001), the method used cannot fully sum up the richness of approaches to studying. More extensive research is needed in these fields to capture the cognitive processes and emotions of motivation and approaches to studying than surveys permit. This has been one goal in this thesis. Self-efficacy, academic motivation and approaches to studying have been studied longitudinally, using qualitative methods. The study

conditions refer to much more than what occurs in the classroom alone and influencing concerns many different situations and different forms.

The findings in the thesis indicate that students' perceptions of their opportunities to influence their study conditions interact with their motivation, self-efficacy and approaches to studying. The data cannot address causality, but it is clear that all the main variables in Figure 3 (see page 40) are important for the students in many ways. It appears that students who perceive great opportunities to influence their study conditions adopt certain approaches to their studies and become more motivated. Students who have high self-efficacy beliefs develop more strategies to influence their study environment. These interactions are reflected in their approaches to studying and are important in the graduates' process of transition to work.

In the future, researchers could explore how students in other programmes perceive their opportunities to influence their studies. Future research could also explore in greater depth the relationships between the three approaches to studying described in this thesis and self-efficacy, motivation and other constructs such as self-concept, attribution of students, wellbeing and academic achievements. A further focus could be on the transition process of the students in relation to their approaches to studying, levels of self-efficacy and self-determination and strategies. A study with the purpose of exploring such relationships in more detail will have implications for practice in higher education. If teachers and other faculty members of institutions could better understand how students perceive their opportunities to influence their studies and why students approach their studies in different ways, they could help the students, *e.g.* by developing their opportunities to influence their study conditions.

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