

EXPECTANCIES AND REALITIES - TO BE OR TO BECOME AN ENGINEER?

A LONGITUDINAL STUDY OF ENGINEERING STUDENTS, 1998-2007. A SUMMARY OF THE RESULTS

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Abstract

In this paper I will present the design and some overarching results of a longitudinal study of four cohorts of students (starting in 1998, 1999, 2000 and 2002) carried out between 1998-2007 at Linköping University. The project was funded by a grant from the Knut and Alice Wallenberg foundation. The paper is based on conference papers and is a summary of theoretical considerations and results that have emerged throughout the years. The study was initiated in 1998, by the study board of the Y-program (Applied Physics and Electrical engineering), a 4½ year graduate study program, considered to be one of the toughest and most demanding graduate programs in Engineering.

In 1999 the CDIO-initiative was launched. The main purpose of the initiative was to make graduate engineering education more applicable and to give more attention to the students' employability. Seven questionnaires have been distributed to registered students in the four cohorts throughout their study period and one year after graduation, and ten students in each cohort have been interviewed on a regular basis during the same period.

In each cohort there were about 13-18% women and the average age was about 20 years. The students' motives for choosing the Y-program as their first choice changed. *In 1998 and 1999* a special interest in mathematics and physics guided the students' choice. *In 2000 and 2002* the choice of study program was more informed by life style and an image of the study context. There was a difference in the students' approaches to studying between the first and the latter cohorts. In 1998 and 1999 the first year was "a test" of the students' capacity to live up to the standards of the program, while it for the latter cohorts was "a test" if the program could live up to the students' expectations.

CONCLUSIONS AND AN EMERGING THEORETICAL FRAME WORK

The opportunity to carry through this longitudinal study has highlighted how complex the concepts of learning, motivation, employability and higher education are. The intention with the CDIO-project was to implement a curricular reform in order to meet the requirements from potential employers and students. This change has proved to be challenging in a program that has got a deeply rooted reputation of being tough and demanding, and where quality aspects are associated with this. The first cohort, 1998, studied within a curriculum where these values were predominant and defended by the students, even those who failed. These students motivation and their approaches to learning and their way of thinking about their future were aligned with an idea of the “hard-working, enduring student, sacrificing some freedom today for the dream of an interesting job and a good life in the future”. The implementation of a new curriculum, with more focus on generic and social skills and team work, as well as more applied knowledge was met by some ambivalence by the students. This “softer” approach could imply a lowering of the quality and impact the reputation of the program. The implementation coincided with the entrance of students with a “new” attitude to studying and learning. These students assumed that an academic grade, of any kind, was a basic requirement for an entrance into a job market, but they expected to get good quality teaching and support in their learning process during that time. They focussed on being and living as students and had vague ideas about what a career as a Grade Engineer would mean. As Csarniawska & Geller (2003) and Weidman et.al (2001) pointed out, the structures of academic institutions are quite viscous, and change tend to be more discursive than structural. Content, as well as form must be related to a context of relevance for the students and the question is what that context is? This study show that there was a change in attitudes between these four cohorts, which challenged the planning culture of the university.

This longitudinal study is made from the perspective of the students, how they understood and experienced the planning, design and implementation of their program and how they related that to their motives and motivations for studying.

As the drop out, and stop out, rates are high in all cohorts, this is one issue that should be discussed at a program - university level. Is this a “natural” selection that is good for the engineering profession or is it a failure for the individual student or for the academic context? Is the decreasing enrolment rates and the high drop out rates an indication of a gap between academic values and the expectations from the world outside, as suggested i.e. by Scott (2003; 2004) and Kyvik, (2004)? The students in our study created their own study-paths and considered shorter or longer stop outs necessary for their survival, for regarding their study motivation and to keep a contact with the world outside the study context. These student strategies challenge the Bologna concept, where the students should accomplish their planned educational steps in an efficient and planned way.

Despite the change in curriculum, the students experiences were that during the first two years they “learned the ropes” and those were to adjust to a highly structured and crammed curriculum where there was no, or little, time for reflection, disturbances in their personal lives or thinking. After having learned that they appreciated project work and more independent assignments, but were a bit sceptical to their qualities. These assignment were time consuming and engaging and therefore they “interfered” their studies. The results from other studies about student learning (Biggs, 1999; Entwistle et.al, 2002; Hounshell & McCune, 2002; Marton & Säljö, 1997) are confirmed in this study, where the students approaches to studying and learning were constructed in the interplay between the individual

students' and the institutions' aims and expectations. The way the teaching was carried out did not correspond to the way the intentions of the program was formulated. The pedagogical skills of the teachers were questioned by the students, although they acknowledged their subject knowledge. As Entwistle et.al (2003) concluded in the ETL- study, the collective WTP:s (ways of thinking an practising in the subject) were based on a content- and teacher centred pedagogy. This approach contributed to the situated conception of learning (Trigwell & Ashwin, 2006) that the students developed. A situated conception of learning is evoked and adopted by students in response to their learning tasks in a particular context once they have started to study and experienced the fit, or misfit, between their personal learning goals and the collective WTP:s in that context. If there is a fit the students have no problem in adjusting and manage. If there is a dissonance, or friction, between the goals this can be constructive and mean a challenge for the student or it can be destructive and create frustration, stress and drop out (Lindblom-Ylänne & Lonka, 2000; Lindblom-Ylänne, 2003; Vermunt & Verloop, 1999). Changing the goals and the structure is not enough, as the students experiences are based on the activities of academic staff and other support staff.

The question of the role of and use of a grade is challenged by our results. On a system level these questions are treated as a matter of supply-demand of human capital and the role of educational systems are conceived as balancing these demands. In a Swedish study (Geschwind & Larsson, 2008) the questions of "How to Higher Education institutions know that their graduate students hold the attitudes, skills and knowledge required in order for them to meet the demands in a rapidly changing work life and How do these institutions use the knowledge and experiences of graduate students in order to develop their study programs and courses?" were put to different stake holders. Their conclusion is that most HE-institutions do not know much about this and that very few make any systematic efforts to get this knowledge, and that even fewer know how to use this kind of knowledge, despite the fact that the development of the relation between HE- and working life institutions are high up on the political agenda and that student employability is one of three high priority goals in the Bologna process. There are also studies indicating that for students these rational choices are not so evident, studies are related to broader life goals and life styles, meaning that students choose to study subjects and programs that do not "fit" with the demands. A study from the UK (Leon, 2002) indicated that the difficulties students experienced in entering the job market was related to cultural aspects, like communication, time management and task juggling. This can be interpreted as deficiencies in student characteristics but also as a clash between two cultures with very different norms regarding communication, time management and task juggling.. Mora et. al (2007) who studies the job satisfaction among young European graduates showed that it was not just personal characteristics that was important for job satisfaction after graduation, but also education-related variables, such as fields of study, graduates' opinion about their educational experience, their basic life values, and their perception of the match between knowledge and competences acquired and those required by jobs. These results are in line with the results of Vaatstra & de Vries, (2007) showing that graduates from activating learning environments attribute more generic and reflective competences to themselves than graduates from conventional learning environments.

Students in the first cohort, 1998, and mature students have reflected on their future career as Grade engineers, but most students had little, or no, idea of what an engineer was doing. It was the elective courses in year three and the grade project in year four that became the turning points, when the students become aware of their employability skills, as well as the lack of those. After having spent four, or more years as students, they had ambivalent feelings and strategies in meeting this new situation. The general situation on the job market has an

impact on the search process as well as on the individual students action plans. That so many of the students argued that they have had to get outside the study context, for shorter or longer time, to retrieve their study motivation and self confidence, indicate that these students had not experienced a cooperative education, until in their final year when they finalised their grade thesis. The situation on the job market was different for the four cohorts when they graduated. One year after graduation 56% of the students in cohort 1998 held a position as Graduate Engineer, compared to 80% in the 2000 cohort.

To return to the initial question, if the students study to be or to become an engineer is difficult to answer, but our results indicate that the first cohorts wanted to become engineers, while the latter cohorts wanted to be engineers, but they had vague ideas of what that would mean.

INTRODUCTION

In 1998 the board of studies for the Master of Science in Applied Physics and Electrical Engineering (further on called the Y-programme) commissioned a project group at the Department of Behavioural Sciences to design and carry out the present study. The basic questions were:

- What are students' study backgrounds and expectations when they enter the programme?
- What are their experiences of workload, co-operation, health and study results at different phases through out the programme?
- Why do students drop-out from their studies?
- How can study-related problems be understood and prevented?

An articulated, although untested, assumption among faculty was that students did not work hard enough and that their basic knowledge in i.e. mathematics was insufficient (Edvardsson Stiwne & Stiwne, 2000). These assumptions were contested by the results of the study and in 1999 LiU, in collaboration with KTH, Chalmers and MIT initiated the CDIO-initiative, with funding from Knut and Alice Wallenberg foundation. In order to monitor what happens in a study program, during a process when the curriculum is changed, the study of origin was enlarged to encompass a longitudinal study of four cohorts of students, those enrolled in 1998, 1999, 2000 and 2002.

In this paper I will present the design of the study and some overarching results. The paper is based on conference papers and these are listed at the end of the paper. The project was funded by a grant from the Knut and Alice Wallenberg foundation and the study is a result of collaborative efforts of many engineering students, academic staff and students from the department of Behavioural Sciences who have made the interviews.

THE CONTEXT – A GRADUATE ENGINEERING PROGRAM IN SWEDEN

In Sweden about 48% of an age group are entering into Higher Education before the age of 25 (Annual report of the Council for Higher Education, 2004). The social background of the entering students is diverse, 70% come from upper- and middle class backgrounds compared to 23% from working class. This uneven recruitment is most evident in long, high status programmes like Graduate Engineering, Medicine, Psychology and Law, as well as in Music and Arts. There are some structural features in the Swedish Higher Education system that differentiates the Swedish model from some other European countries'.

In Sweden there is a long tradition of Adult Education and Lifelong learning. Students can get complementary or supplementary grades after Upper Secondary School, with state grants and student loans. As a consequence of that the age span can be quite big in some classes at the University. There are no student fees in Higher Education and all students are qualified to student grants and student loans for twelve semesters. In Sweden most students leave home and start a life of their own, maybe for the first time, when they go to University.

In 1998 the Y-program was a 4½ year graduate study program. It was considered to be one of the toughest and most demanding graduate programs in Engineering. The Y-students had a reputation of being ambitious and clever, but also a bit square and dull, (Edvardsson Stiwne et.al 2002). The program was managed by a study board within the Deans office. The board had an elected chair and the members were

- Teachers from the departments running the specific classes
- Students from different cohorts
- Administrators from the Deans office.

A study program did not belong to a department but "bought" courses from different departments. Every August about 180 students were admitted. They were enrolled to 5-7 classes with about 30 students. Female students were in minority and were allocated to some of the classes, which meant that there always were some all-male classes. Senior students

were appointed as form masters/mistresses, teacher assistants, mentors etc. for first year students.

The curriculum the first year consisted of a foundation course in mathematics, linear algebra and perspectives on mathematics and physics. From 2002 there was an engineering project (a CDIO-class) the first semester. The work was organised in lectures (the whole cohort); classes (lessons with one class); laboratory lessons (the students work in pairs or small groups) and projects (small groups). Lectures were given by professors, who also tutored and supervised projects. Teaching assistants were supervising in classes and laboratory lessons. Course evaluations were internet-based summative evaluations as well as formative, process evaluations and the results were communicated to the chair of the study board, where the results were followed up and attended to. On the internet, each course was evaluated according to a scoring system. An examiner could get an honourable mention or a request to make some improvements.

In 1999 the CDIO-project was initiated. This was rendered possible with a financial support by the Knut and Alice Wallenberg foundation. The main purpose of the project was to make graduate engineering education more applicable and to give more attention to the students' employability. In order to meet the critique from the 1998 cohort, of the tough start in mathematics, a foundation course in mathematics was launched this study year.

In 2000 a new class was launched, Yi (Y international). The students were offered classes in a foreign language and to spend one semester in a foreign country. These students were not supposed to participate in the CDIO project course during the first semester. The implementation of the CDIO curriculum started in 2000, with structured interviews with all teachers involved in the Y-program in 2000/2001. The purpose of the interviews were to make the teachers familiar with the core concepts in the project, Conceive, Design, Implement and Operate. Another intervention, in line with the CDIO-curriculum, was that all new students filled in a "Beginners survey" and the results were followed-up by the study counsellors. They identified what the main obstacles and problems were, and offered individual counselling to the students.

During the study year of 2001/2002 the implementation of the CDIO curriculum continued. The student reception was improved and the first CDIO project course was planned. Potential project managers were taught a project model, LIPS, and there was a request to different departments for interesting projects. The "Beginners survey" was launched to all students in the Faculty of Technology, in order to make it possible to compare the different study programmes.

In the study year of 2002/2003 the first CDIO-project course was implemented during the first semester. Besides the follow up of the "Beginners survey" the study counsellors launched the idea of "Student mentors". The aim was to facilitate the students' adjustment to university studies with the help of a counselling method "Supplemental instructions".

The implementation of the CDIO curriculum has continued from 2003, but this is beyond the scope of this paper. From the description above it is concluded that due to planned changes, the study contexts of the students have been changing between 1998 and 2007, and this will be considered in the interpretation of our data.

THE DESIGN OF THE STUDY

The design of the study is based on

- a) Questionnaires distributed to all students in each cohort twice the first year (Q 1 - 2) and once a year during their study year 2-5 (Q 3-6) and finally one questionnaire one year after graduation (Q7).
- b) Interviews with 10 students, 5 male and 5 female, in each cohort. The same students have been interviewed twice the first year (I 1-2) and once a year during their study year 2-5 (I 3-6). A telephone interview was made one year after graduation (I 7).
- c) In the 1998 and 1999 cohorts those students who dropped out during the first semester were interviewed on telephone.

The first 4 questionnaires were distributed, filled in and collected during a break in a lecture or lesson. The first questionnaire (Q1) was filled in during the first two weeks and had a focus on the students' previous study experiences, their expectations of the study program and their thoughts about the future. After the first semester a second questionnaire (Q2) was filled in. The focus was on their experiences of the first semester. They were asked questions about their study results, experienced workload, thoughts of dropping out, experiences of cooperation with lecturers and peers, perceived study related health and well being and their identification with the study program. At the beginning of their second year the third questionnaire (Q3) was filled in, where they were asked to report their experiences of the first year, in the same areas as in Q2. In the fourth questionnaire (Q4) the focus was their experience of the second year and in the fifth and sixth questionnaire (Q5 & Q6) their experience of their third and fourth year. The last questionnaire had a focus on their job search process, entry into the job market and their reflections on their education in relation to their present job and career.

In the interviews the students were encouraged to talk freely about the issues covered by the previous questionnaire. Results from the study have continuously been fed back to the program and reports and conference papers have been published (see list of publications).

In this paper the four cohorts will be described and treated as separate units and be compared to each other, based on the changes made in the study context between 1998-2007. *The four cohorts of students* are described as.

- 1998 - the base line who enrolled and graduated within a traditional curriculum and witnessing the implementation process
- 1999 - enrolled in a traditional curriculum where the management and the staff were planning the CDIO-project. CDIO-project in their third year.
- 2000 - surveyed and involved in the planning process. CDIO-projects in their third and fourth year.
- 2002 - the first CDIO cohort. CDIO-projects in their first semester, third and fourth year.

THEORETICAL CONSIDERATIONS

As results from our study have emerged and have been discussed in different contexts and compared to results from other studies, our theoretical frames of references have changed, due to these circumstances. In our final report (to be written) we will try to summarize these efforts and come up with a working theory. In this paper our theoretical considerations are mainly to be regarded as frame works for our interpretations of the emerging results at different stages.

Higher education in a global context

Consequences for Higher Education institutions are that the role and image of the University is contested when external actors call for influence on the design of study programs, research strategies and the management of the Universities. “Knowledge” becomes a product and its content and form is negotiated in a context where different actors strive for power, status and financial positions (Czarniawska & Geller, 2003). Consequences at program and course level are that in order to survive in the national and international competition for students, they have to be on the look for what attracts and interests the students, and adjust their curriculum to this. The images of the students thirsting for knowledge and the lecturer filling these vessels with knowledge, are challenged by an image of the students as consumers who are looking for the cheapest but tastiest and most easily digested product on the market.

In society the employers demand for employable students also challenges the Universities strive for critical thinking, “bildung” and broad, generalised study programs. Weidman et.al (2001) as well as Czarniawska & Geller (2003) point to the fact that although these challenges might be at hand, the University is a viscous structure and changes tend to be more discursive than structural. Students are socialised to be “good students” rather than to be “good engineers” or “good psychologists”. Diversity and heterogeneity tend to be political prestige words in a context where strong academic norms and cultures contribute to homogeneity, conformity and exclusion, and Turner, Myers & Creswell (1999) argue that the challenge for the Universities, at a program- and course level, is to realise that in a context where knowledge and qualifications have an expiry date the strategies and action of yesterday are no longer valid. Content and form of the curriculum must be related to a context of relevance for the students, different ways of learning must be acknowledged and accepted and students and external actors must be given the possibility to influence the realisation and implementation of a study program.

One explicit goal in the Bologna process is that academics should be employable after three years (the first cycle). In some HE institutions this can be regarded as a challenge to more traditional, academic values, where the development and maintenance of broad, advanced knowledge in different subject areas have been considered the main goal (Scott, 2003; 2004; Kyvik, 2004; Marga, 2004). The transformation of program- and course syllabuses is by tradition regarded as an intra-academic, collegial issue, which means that opinions, demands and needs from other stake holders might be neglected, or even rejected (Scott, 2004). But with the aim of an enrolment rate in HE of about 50% of a cohort, and with the goal that they should be employable on the labour market after that, the authority, credibility and relevance of HE-institutions will face challenges from “the outside” to a higher degree than before. The changes and reforms that are undertaken might be considered of high quality and high relevance *within* the academic value system, but less relevant in an external context, and therefore unintended consequences of planned actions might be experienced such as i.e. unemployment of academics, low attrition rates and high drop out rates and low motivation among students and faculty (Scott, 2003; 2004; Kyvik, 2004).

Student motivation

When a diverse group of students with different motives for studying or being a student are at hand, it is important to generate theories of student motivation that relate to such a context. In a review of research about student motivation, Karlsson (2004) showed that most studies focussed on the relationship between motivation factors and academic achievement and success, generating different goal theories (Bay & Daniel, 2003; Grant & Dweck, 2003;

Hyde & Kling, 2001; Snyder et.al, 2001). A basic assumption in these studies is that the students enrol in Higher Education because they *have* a goal and a desire to achieve this. Bogler & Somech (2001) has developed a categorisation of students, based on their study goals:

- *The instrumental students.* Their prime goal is to graduate and get a diploma that gives them the authority to work with specific tasks and/or within a specific profession.
- *The scholastic student.* Their prime goal is to learn, to get the intellectual and professional knowledge and skill they find stimulating and rewarding from a professional, personal and intellectual level.
- *The collegial student.* Their prime goal is to live a rich and rewarding student life, to cultivate social and professional contacts for the future.

According to those theories all students want to manage, but their reasons for doing so are very different. Related to this is the question why some students, in spite of clear goals, give up when they face set backs, while other students are challenged to surpass themselves and show the world that they are not beaten. Snyder et al (2002) argue that “hopeful students” are those who negotiate their desired goal with their anticipation of their potentiality to fulfil these goals and who come to the conclusion that they can do it, in some way or another. Markus & Wurf (1987) argue that students have an image of their “possible selves”, what they want to be and who they want to be in a future. These theories relate to the conclusions that Aittola (1995) drew from his interviews with Finnish students, that goals were related to life style and identity as well as to tasks and professional careers.

There are other researchers that have shown that motivation is a contextual and relational concept and that students’ motives and motivation are created in the relation between the individual student and the context (Halamandaris & Power, 1996; Struthers et.al, 2000; Drew, 2001). These results are confirmed in our longitudinal study where goal theories are challenged by results indicating that many students are very uncertain about their goals when they enrol in and enter into a study program (Edvardsson Stiwne et.al, 2000; 2001; 2003). From our results we have concluded that it is not until the students are becoming students in a study program that they become aware of their goals as well as of their qualifications and opportunities to fulfil the program.

Student learning

The first year in a study program is considered crucial for the students’ approaches to studying and learning as well as for the socialisation into a future professional life (Entwistle, 2003; Weidman et.al., 2001). Several studies show that approaches to studying and learning are constructed in an interplay between individual students’ and the institutions’ aims and expectations (Biggs, 1999; Entwistle et.al., 2002; Hounshell & McCune, 2002; Marton & Säljö, 1997) and that student learning is based on a relation between their earlier study experiences, what they expect to learn, their aims for the future and the teachers approaches to teaching (Entwistle, 2003). This relation is domain specific, i.e. the relations are constructed within a specific context. ETL (Enhancing teaching-learning environments in undergraduate courses) is a conceptual framework constructed around a focal concept “Quality of learning achieved” (Entwistle, 2003). In that framework the concept of “*student learning*” has been broadened, from a main focus on conceptual understanding to the covering of additional skills and ways of thinking, both academic and professional. These are referred to as WTPs (ways of thinking and practising in the subject), the identifications of crucial topics or concepts that influence how the teaching is carried out and how understanding develops within a specific subject area, i.e. engineering. Three emerging pedagogical concepts related to this model of

student learning are *troublesome knowledge* (Perkins, 1999), *threshold concepts* (Meyer & Land, 2002) and *delayed understanding* (Scheja, 2002). Within this conceptual framework one assumption is that the way a subject is taught is not only due to the relation between teachers approaches to teaching and student learning (Prosser & Trigwell, 1999; Eley, 2002) but also to the nature of the subject taught and the organisational prerequisites at hand. (Entwistle, McCune & Walker, 2001). One conclusion from the ETL project is that the ways *teaching* is carried out in a course depend on the collective pedagogical WTPs of teachers providing it as well as on institutional priorities, the teaching ethos of the department and the strong outside pressures coming from the academic community and from validating bodies (Entwistle, 2003). Situated conception of learning, like prior experiences of learning, can also be indicators of learning approaches and outcomes of learning (Trigwell & Ashwin, 2006). A situated conception is one that is evoked and adopted by students in response to their learning tasks in a particular context and may reflect the aims they have for their studies *once they have started that study* and experienced that particular study environment. Meyer (1991) drew attention to dissonance in students' learning patterns, i.e. when the expected and theoretically coherent linkages between learning conceptions, intentions, motives and processes failed to appear in empirical studies. Using the concept of "study orchestration", defined as a contextualised study approach adopted by individual students or groups of students, three aspects of student learning were recognised: the existence of qualitative, individual differences in students approaches and engagement in learning tasks; the influence of context on the engagement; a variety of conceptions of learning among the students. Some students have problems in adapting to their study environment and this incongruency, or friction, (Vermunt & Verloop, 1999) is conceptualised as dissonant study orchestration (Lindblom-Ylänne & Lonka, 2000; Lindblom-Ylänne, 2003). This friction can be constructive and challenge students as well as destructive and inhibit students learning or contribute to their withdrawal.

A basic assumption in the ETL-project is that learning takes place in a social context and that that different persons (students as well as academic staff) experience different "fits" with a specific context. Most engineering students must, and have the intention to be, employable *outside* the academic world. Some studies indicate that unintended consequences of a situation where the design of study programmes are *not* aligned to the goals and motives of the students can be credentialism (i.e., education inflation in the process of job placement) and increasing rates of graduate underemployment (Coté & Allahar, 2006). From the results of a longitudinal study Cote & Levine (2000) concluded that *input motivation for personal and intellectual development* best predicted output skills acquisition and academic achievement, independent of input intelligence quotient and adjustments in university settings. Their conclusion is that students input motivation for personal and intellectual development is more important as predictors for student satisfaction and student retention than high points required for admission and/or curricular adjustment. These results challenge other results suggesting that situated conception of learning, like prior experiences of learning, are the key indicators of approaches to studying and outcomes of learning (Trigwell & Ashwin, 2006; Lindblom-Ylänne, 2003). The difference between these two perspectives is that the first one assumes that curricular and/or other changes are subordinated the motive and motivation of the individual, while the second one assumes that curricular and/or other changes influence the motivation of the individual.

Entry and first year experiences.

Entering a new work place, or a new study programme, can evoke hope for a change of life style and social identity as well as for making new friends and the start of a future career. But

it can also evoke anxiety and a fear of failure or of not fitting in. The question is should we expect young students to adapt to the old traditions and culture at a University or should the University adapt to the expectations and needs of young students? Maybe this is not a question of either or, but a question of negotiating reality in a collaborative creation of a future Higher Education landscape.

What does it mean to become a student of engineering in 2001? In entering the University as a social system, students take part in various “rit de passages”. Such rituals serve the purposes of controlling those entering the system. The meaning of rituals is to mark the boundaries between categories and situations. During an academic career there are various membership rituals (dubbing, graduation, defending of a thesis, conferment of a doctor’s degree, inauguration of professors) that could be interpreted as fulfilling these purposes. In becoming a student three phases have to be passed (Tinto, 1993; Ek-Nilsson, 1999). In the phase of *separation* the student as a novice is treated as one in a group that is the object for humiliation and scorning from the masters. Students are categorised as “technologists”, “psychologists” or “economists” and ascribed characteristics like “nerd”, “profound” or “snob”. Students may have to either call their previous social identity into question or have it confirmed. In the phase of *transition* the student balance at the boundaries of belonging, or not belonging, to the aspired group. In our study this is evident during the first semester. Early drop-outs state their reasons for leaving the programme that “this was not their piece of cake” and that they found it hard to learn the ropes. In the phase of *incorporation* the novice is incorporated as a full member with a “new” identity. In our study we can see that after two years, when many have dropped out, there is a successful elite left who find their reduced study-group cohesive and the relationships with the teachers more collegial than before. Initiation rituals fulfil the purpose of strengthening the boundaries between equals but it also widen the gap to “the others” (Edvardsson Stiwne et.al, 2001).

In a longitudinal study in Finland, Rautopuro & Vaisanen (2000) studied the changes in study experiences of one cohort of students during their four years of studies. Their results showed that the students seemed to be gradually more negative to their study situation as years went by. They concluded that this change in attitude could be due to the development of a critical thinking and to the fact that students by the end of a programme looked for vocational relevance of the studies, an explanation that is supported by House (1999). The negative trend could also be understood as a discrepancy between students’ expectations of their university studies and their experiences of the same, according to Pancer & Hunsberger (2000), who also reported that students’ experiences of the first weeks and months of their university studies usually were much more stressful and challenging than anticipated. In the Finnish study the negative study-related affects, such as disappointments and stress, increased more between the 1st and 2nd year than between the 2nd to the 4th year. The greatest decline in students’ positive feelings about university life thus seems to occur during their first year, when the perceived discrepancy between expectations and reality is likely to be the most salient. The importance of psychological well-being (measured as perceived stress, depression, low self-esteem) for social adaptation and academic achievement in the first year of university studies is well demonstrated in research as well (Tinto, 1993; Wintre & Yaffe, 2000; Rautopuro & Vaisanen, 2000).

Students have more positive attitudes towards their learning environment when faculty and students share common attitudes and values, when interpersonal exchanges are frequent, friendly and not rigidly hierarchical and when there is a departmental go-ahead spirit (Pascarella & Terenzini, 1991). Other studies have confirmed that students adjustment to

the study context is correlated to study outcomes as well as to dropout rates (Astin, 1977; Cutrona, 1982; Gallander Wintre & Yaffe, 2000; House, 1999; Pascarella & Terenzini, 1991) In the interpretation of our data we have drawn on Tintos (1987) definition of "drop-out" as a consequence of *faculty and student failure* to accomplish the requested outcome. Tinto (ibid.) argues that having students to stay in a study programme should not be the primary goal for a university. Instead, focus should be on the facultys' ability and ambition to provide a stimulating and challenging study context so the students *choose* to stay. Tinto (ibid.) also argues that temporary study leaves and periods of recovery should be regarded as normal study behaviour and not as failures. Instead one should regard those who go straight through the study programme as deviants. Salminen-Karlsson (1998) reviewed the research about the relation between teaching methods and female students well-being and success in study programmes of Masters of Engineering. She concludes that work under pressure is endemic in these study programmes and that women seem to react more negatively to that than men. She also points to the fact that many studies show that female students, compared to male students, demand a curriculum that is more connected to real life situations as well as more continuity between different courses.

Turning points and entry into working life

Studies about graduate employability and employment are focusing on three main questions. What will the graduate job market look like in the future? What knowledge, skills and competencies will be demanded and how should the higher educational systems develop to meet these demands? (Atkins, 1999; Clarke & Winch, 2006; Teichler, 1995; Yorke, 2006; DeWeert, 1997; Morley, 2001). *Employability* is a key concept in this kind of research, a concept that indicates that an employable person holds knowledge, skills and characteristics that makes that person useful and valuable in a specific context. The definition of employability as "*a set of achievements – skills, understandings and personal attributes- that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy*" (Yorke, 2006) catches the complexity and diversity of the concept.

There are several studies indicating a gap between different stakeholders definition of what knowledge, skills and characteristics a graduate person could be expected to hold (Becker, 1964; Teichler, 1997; 1999; OECD, 1998; Rose, 2005; Clarke & Winch, 2006; Smetherham, 2006; Atkins, 1999; Scott, 2003). These studies focus on the role of tertiary education from a social, economic, labour market perspective with an aim of finding a way of predicting a balance between supply of "human capital" and the demand of knowledge and competence on a globalized, competitive knowledge market.

There are also some studies based on students experiences of being students and entering the job market. Leccardi (2005) argues that biographical insecurity makes it difficult for young people to picture themselves in a future and therefore they have difficulties in imagining how their choices and non-choices today can be related to the future. Rapid technical development and a feeling that time moves on too quickly, contributes to a perception of not having, and not being able to have, control over their own lives.

In a longitudinal, comparative study, of the relationship between life goals and fields of study among young European graduates it is concluded that there are similar patterns among students in seven European countries, despite cultural and labour market differences. Significant similarities regarding gender, educational and social background and life goals, were strongly related to specific fields of study (Garcia-Aracil et.al, 2007). Engineering graduates i.e. were predominantly males with high marks in secondary education and a

vocational educational background. They were not interested in life goals such as social prestige, personal development, varied social life, home/family life. They were more interested in professional development through academic inquiry and in making money. In a study context they wanted to develop their own ideas and to have challenging and well-ordered tasks and they preferred working in teams.

Within the same longitudinal study the job satisfaction among young European higher education graduates was studied. Mora et.al (2007) found that the total effects of educational determinants on job satisfaction were quite homogeneous across Europe. A significant positive link was found between job satisfaction and a well-designed program, content of courses and practical learning. The positions held by the students four years after graduation, did *not* fulfil their expectations regarding earnings and possibilities for life-long learning. The results indicated that a perceived surplus of qualifications and competences was one of the most relevant causes of job dissatisfaction. A high level of disappointment was found when graduates could not use their acquired knowledge and competence at work. On the other hand, being under-educated, or having lower competencies than required, increased job-satisfaction! Young graduates with permanent job contracts and full time jobs were most satisfied, especially those working for the public sector and in small firms.

METHODOLOGICAL CONSIDERATIONS

Questionnaires: Through out the study seven questionnaires (Q 1-7) have been distributed, with questions focusing on issues relevant for the actual period of study as well as some recurrent questions about self-rated study results, study satisfaction, study related health, identification with the program and feelings connected with their studies. The base for estimating the response rate is the number of registered students/year (Table 1).

Table 1: Registered students at the beginning of each school-year. Percentage of women within brackets.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ht										
1998	187 (20%)	143 (20%)	95 (20%)	83 (20%)	76 (21%)					
1999		204 (13%)	162 (15%)	77 (13%)	72 (11%)	77 (12%)				
2000 Y			178 (15%)	141 (14%)	88 (13%)	79 (11%)	75 (12%)			
2000 Yi			31 (39%)	25 (40%)	12 (50%)	10 (50%)	9? (33%)			
2002 Y					160 (11%)	130 (11%)	87 (11%)	70 (13%)	68 (13%)	
2002 Yi					32 (28%)	23 (26%)	11 (27%)	9 (11%)	8 (13%)	

The response rates are calculated as the relation between filled in questionnaires/registered students for each year. Drop out rates are most frequent during the first semester (Table 1). If we look at the registered students we estimate that on an average (across all cohorts) 32% dropped out after the first year, and in the fifth year 48% had dropped or stopped out. None of the questionnaires were coded and the students were anonymous. This means that

individualised reminders could not be sent to students who did not return their questionnaires. The first questionnaire, Q1, was filled in within the first two weeks of the first semester.

Table 2

Response rate Q 1-6. Percentage of females within brackets

Total	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Q1 89%	82% (18%)	87% (13%)	97% (13%)		88% (11%)					
q2 82%		80% (18%)	82% (16%)	88% (18%)		76% (13%)				
Q3 78%			84% (18%)	66% (13%)	82% (18%)		79% (12%)			
Q4 78%?				81% (14%)	97% (11%)	82% (15%)		61% (17%)		
Q5 71%					92% (23%)	60% (19%)	59% (9%)		53% (10%)	
Q6 56%						82% (29%)	56% (16%)	51% (14%)		38% (12%)
Q7										

The response rate declined over the years (Table 2). The reasons for this are partly due to the design of the study, where the first questionnaires were distributed and collected by the researchers during “well- attended-2 lectures. One reason can be a variation in attendance at those lectures and the problem of identifying non-attendant students and send them reminders. The latter questionnaires were posted to the students, but despite reminders the response rates declined. The drop-out rate can be systematic and may result in a bias in the results (Qvist, 2000), that the students who have responded are those who have managed to continue and not dropped out. One evidence of that is that the heterogeneity among the cohorts, which was evident in the beginning of the study, have decreased over time and the cohorts appear to become more homogenous. The results of the questionnaires will therefore to a great extent refer to 'the successful' students, those who have managed their studies and their study situation. From the questionnaires we can only draw conclusions on a cohort level as data cannot be referred to individuals.

Interviews

In the interview material we have longitudinal data of individual students expectations and experiences during their study period, job search process and entry into the job market. In sampling students to be interviewed we used lists of all students who were registered for their first semester. The students were listed by class, name, birth registration number and address. From this list we made a strategic sampling in order to have students from all classes and a variation in age and gender. The study board requested that 50% of the interviewed should be females, in spite of the fact that they were only between 13-20% of the entire cohort. Only the researchers know who the interviewed students are. The students were contacted and informed of the design of the study and asked if they would accept to be interviewed. They were also informed that the interviewing would be on a regular basis once a year through out their entire time as students with a follow up about one year after graduation. Very few students refused to participate and for those who did we had reserves.

Biographical methods are relevant if the purpose of a study is to highlight and interpret the experiences and insights that individuals and groups are experiencing in their every day life, to focus individual perceptions of events, situations and feelings, and thus how they create and give meaning to their lives (Roberts, 2002). Denzin (1989) point to a variety of concepts related to biographical methods, i.e. life, self, experience, narrative, narrator, life story, life history and case studies. These concepts indicate that the research focus is on the unique experiences of unique individuals instead of the generalised experiences of a generalised individual. Much of the research in social and behavioural sciences have overlooked or neglected the knowledge that individuals hold and thereby also the dynamic that is created when individuals, with different backgrounds, experiences and prerequisites shall cooperate, make decisions and work together. Biographical research shares a common outlook with qualitative research more generally but it also has some challenges of its own.

In order to understand *who* and *what* we are and the *things that happen to us*, we tell stories about our lives, about our selves. But our stories are not always the same. What is told and how it is told depends on the situation, to whom we are telling the story and how we wish to present ourselves (Goodson & Sikes, 2001; Giele & Elder, 1998; Czarniawska, 1998). Life history work has contributed to the move away from modernist master narratives and generalised subjects to a focus on agentic selves, of the knowledge and experiences of singular, knowable persons where self and other are closely entangled in a value impregnated environment, where who you are and how you present yourself is more important than what you do or who you relate to (Sennet, 1999).

SUMMARY OF RESULTS

The entering students

In each cohort there are about 13-18% women and the average age is about 20 years. They go to the University about one year after their A-levels. Some students have spent one year completing their military service, working and/or travelling. Only about 8% do not have an A-level from a natural science/technology program.

Previous study experiences

All students have been successful in Upper Secondary School, some of them at the price of hard work, others without to much efforts, which indicates a great variation in perceived work-load. The cohorts of 2000 and 2002 describe an accelerating rush and competition for the highest grades. About 30-40% have experienced some kind of study-related stress (sleeping problems, stomach problems, feelings of self doubt and insufficiency; problems of concentrating and depressions). These experiences are gender related. The increase in students' experiences of study related stress is considered in an overall cultural context. Studies of psychological well-being in the Swedish population show that it is in the age group of 19-29 (young adults) the increase of psychological ill-health is accelerating (Hallsten et.al, 2002; Wenemark et.al. 2003).

Motives and motivation for enrolling in the Y-program

The students' motives for choosing the Y-program as their first choice has changed. *In 1998 and 1999* a special interest in mathematics and physics guided the students choice. The students had a clear goal of a future as a Graduate Engineer on an anticipated promising job market. By the end of the 1990ies the IT-boom was declining and *in 2000 and 2002* the students' were more ambivalent to their future. The job market was more insecure and the breadth of the program was more in focus. Arguments for this was that it enabled the students to postpone their career choices. The choice of study program was more informed by life

style and an image of the study context. There was a difference in the approach to the study environment between the first and the latter cohorts. In 1998 and 1999 the first year was “a test” of the students’ capacity to live up to the standards of the program, while it for the latter cohorts was “a test” if the program could live up to the students’ expectations. In all four cohorts the students expected long working hours (about 50h/week) and a challenging and stimulating co-operation with faculty and peers.

What they expected to learn

Interviewed students expected to learn to solve problems, to analyse complex problems and to get in touch with research based knowledge in physics, communication, electrical engineering etc. They also expected that knowledge, as well as work methods, to a high degree should be related to their future jobs as graduate engineers. In the cohorts of 2000 and 2002 the students had a more instrumental and pragmatic attitude to their learning. They wanted to learn how to study in order to get an exam.

“Without an academic grade you are nobody on the job market today”.

Aims for the future.

In 1998 and 1999 the students were aiming at a bright future as Graduate Engineers, with good wages and good career opportunities. There were not many who considered an academic, research based career. In 2000 and 2002 the students were aiming at a University grade in order just to get into the job market. These students said that they just focussed on the next year and avoided to think about the future. Rather than taking a low-skilled work after graduation they anticipated to take study leaves or take more classes. They did not worry too much about the future, *“it will sort itself out somehow”*.

THE STUDENTS’ EXPERIENCES OF THE FIRST YEAR IN THE STUDY PROGRAM

Their first impressions of the study context

In 1998 and 1999 the students’ described their first impressions of the academic study context as “chocking”, “chaotic” and “overwhelming”. Managing a high tempo and tough classes in mathematics evoke much agony and self doubt. The perceived harsh attitude of the lecturers intensified their feelings of panic. In 2000 and 2002 the students reported different experiences. They praised the activities related to the reception of the students and they felt “taken care of and lavished”. The lecturers’ attitudes were perceived as “helpful”. The students commented that the high proportion of teacher-led lectures and lessons was unexpected but very positive. The interviewed students commented that they were aware that the image of “The Y-student” was that of a bore and a nerd with no social interest or competence, but although this was true for *some* of their peers, that it did not correspond to their own self-image. Some students solved this dilemma by not telling people outside the class that they were a “Y-student”. They believed that when you got to know these “other” people they were much the same as them selves, ambitious and clever students who also liked to party and participate in student activities.

Study results and study achievements

In questionnaires and interviews the students were asked to comment on their average study results during the first year. Within all cohorts three categories of students were identified:

- 1) Those who were satisfied of being in phase with lectures and laboratory lessons. They had not failed any major examinations or tests. They had no aspirations above passing.

- 2) Those who had failed tests and examinations from the start and lagged behind. They experienced a vicious circle, they did not have the capacity or energy to work with new courses and manage resets at the same time.
- 3) Those who were surprised that their results were better than they had anticipated. These students had raised their aspirations and were aiming at the highest grades.

There were students from all three categories in every cohort, but the proportions were different. In *the first category* a majority of students are in the first cohorts. They experienced a tough start and their strategy to “survive” was to persuade themselves that in order to reach their goal of becoming a graduate engineer, they had to make some sacrifices and to modify their achievement goals. The students from the latter cohorts had another motivation for their low aspirations. They did not want to sacrifice their social life and their well-being, so they gave priority to other things than studying and therefore they were satisfied by just passing.

The students in *the second category* had panicked when they started to lag behind and in the interviews they responded very emotionally to these issues. The reason for panicking differed among the students, most of them in the 1998 and 1999 cohorts. One category was those students who panicked, but soon realised that they had to change their study strategy and who were confident about their capacity to do so. They were accustomed to achieving good results without great efforts and they had began with the same attitude at the University. Another category was the students who had realised that they had to reconsider their motivation to study and/or their capacity to fulfil the requirements of the program. In the cohort of 2002 there were no students in this category. Together with the cohort of 2000 they were in majority in *the third category*, where the students were more successful than they had expected. They were surprised themselves, as they had expected a much tougher assessment from what they had heard from senior students and from the marketing of the programme. The students attributed their success to luck, hard work or “it obviously suits me”.

Study satisfaction

In all interviews the students commented on their satisfaction with their overall study context. Although they belonged to a cohort of about 180 students, on a Campus with about 26.000 students, their study life was very much limited to the life of their class or their campus corridor (Edvardsson Stiwne, 2004). During the first weeks they participated in a lot of Y-program activities. During these first weeks people grouped together in smaller units as peer groups, study groups, commuting groups, student union groups etc.

For commuting students it was considered a strength to have a “normal” life outside the University. They had friends and family with non-academic lives and interests, which helped them to continue “to be themselves”, but also contributed to a feeling of being an outsider at the University. The student union students, who very soon engaged in student union activities, were proud to represent their study program and they enjoyed the opportunities to make interesting and valuable contacts and connections within the whole University. These students were described as “an exclusive clique who are electing each other”, by those who were not engaged in these activities.

When the Y-students compared themselves to other students they characterised themselves as more ambitious, more selfdemanding, smarter and more hard working than other students. When they compared themselves to non-students of the same age they described themselves as living a good and comfortable life, in spite of hard study work, and they could not think of “an ordinary job” as an alternative.

“I enjoy studying, much more freedom than an ordinary job, I like this life”.

In all cohorts the students had the opinion that peer groups were very important, but for very different purposes. In study groups they could help, and get help from one another when they got stuck or did not understand. Peer groups were important for social well being, for keeping up healthy daily routines and for feed back and encouragement when things are tough and not easy (Edvardsson Stiwne et.al, 2001). Peer groups also become self referential in the evaluation of their own learning and achievements.

In the first cohorts it was entirely up to the students to arrange their own group work, with the result that some students became very isolated. In 1998 the students perceptions were that the lecturers norms of what characterised a “good student” also sat the standards for their own groupings, i.e. “the smart ones” and “the serious ones” grouped together and as an opposition to that “the not so smart ones” and “the not so serious ones” grouped together.

The students’ experiences of their teachers’ competencies were unified. They were considered to be highly competent and professional within their specific fields of knowledge, but lacking in pedagogical competence. In the first cohorts many students were upset by the lecturers attitudes towards the students. This was exemplified by their comments that *some* lecturers seemed to be fed up with students and seemed to enjoy tormenting the students. Another impression was that some lecturers did not bother to explain issues that they considered too simple and too evident. The students’ strategies to cope with this were to try to interpret and understand the lecturers’ communication style. The students in 2002 had a much more positive attitude towards their lecturers, who were considered helpful and considerate but still lacking pedagogical competence.

Work load, health and well-being

In all cohorts the average working hours/week were 40-50. Lectures, classes and laboratory work were highly attended to and as the students also expected to work long hours these circumstances also were considered fair. What was creating stress and ambivalence was a conflict between tough working conditions and the status of the program. “It is supposed to be a tough education, you are becoming a graduate engineer, and then it has to be demanding an tough”. The student added that otherwise it (the study program) might loose its’ reputation and image. Students also pointed to the fact that they did not see any alternative to studying. Leaving home, fixing accommodation, economy, household duties and creating new social networks, were also considered very stressful activities during the first semester and in conflict with a demanding study situation. About 40% of the students had some time during the first year considered taking study leaves (stop-out) or to drop out. The reason for that was not primarily the work-load or failing tests but the experience of a lack of meaning and relevance. The students hoped that the first year was the worse and that it would be more interesting later.

Students approaches to studying and learning during their first study year

In spite of different prerequisites and different aims, the approaches to learning that emerged during the first year were focussed on how to study/learn in order to get their credit points and manage their tasks. The problems and obstacles they identified were related to individual goals and approaches to studying, but from the results we find that these are also related to the cohorts, i.e. the contexts. Main goals in the cohort of 1998 were to manage a prestigious and tough study programme with the aim of getting a good job and good career opportunities. Their main study strategy was to make immediate personal and social sacrifices for a future

goal. Failures were ascribed to their own lack of knowledge and competence and to too small sacrifices. The students in the cohort of 1999 had very much the same main goals as 1998. As the study board had changed the curriculum, a foundation course in mathematics had been inflicted, the study context had changed and they could not rely on the experiences of previous cohorts. As the foundation course was to be taken in parallel with other classes, the main study strategies of this cohort were to make priorities. They did not attend all lectures and classes. They dropped classes that were considered “irrelevant or incomprehensible”. The female students in this cohort argued that they gave priority to group discussions or classes where they not were presented ready-made and fixed solutions but were encouraged to think for themselves. They actively created learning situations themselves.

The cohort of 2000 were “taught” the value of finding a balance between work- and leisure time and they said that they were encouraged, by mentors and study counsellors, to work in groups. They expressed a more open critique to a teaching model that they described as based on fact-feeding and copying. These students focussed on self-discipline and structure and created individual strategies in their active choices of lectures, lessons and group sessions. In doing so, the focus was as much on *who the lecturer was* as on the content. The cohort of 2002 expressed the same strategies. With reference to the fact that they were the first cohort who had worked in a project group, their strategies were influenced by an element of comparison and self evaluation in relation to their peers.

“You get stressed when you see how far the others have come”.

The study results were not considered important per se, they were important in relation to the comparisons made.

In reflecting back on their first year, the students were astonished that they had learned so much and that they were able to solve complex problems. In order to keep up the motivation for another 3 ½ years the students’ strategies were to think about and imagine the interesting and relevant courses that they anticipated would come *after the first year*. They hoped to realise the necessity and relevance of enduring “the necessary evil” of the first year.

Students socialisation into the study context

Weidman et al. (2001) argue that students are socialised into the academic context in different stages. The stages are not linear or passed step wise. Depending on the social and cultural background of the students the stages are enacted individually in a study context that is designed for an anticipated homogenous cohort, especially during the first year.

The anticipatory stage: The students’ first impressions of the study context are guided by their *individual* backgrounds and expectations. This is further emphasised with the governmental goal of 50% of an age group enrolling into Higher Education before the age of 25. The students’ professional expectations are often guided by stereotypical images, the way the profession is presented in media, family, friends and life style magazines. During this stage the students listens to and observes what is going on and they are occupied of “learning the ropes”. They comply with information “from above” or “from outside”.

In this study this is evident in the way the students describe their first impressions of “the academy”. The differences between the first and the latter cohorts can be interpreted as an evidence of the theory that student learning is based on the relation between their earlier study experiences, what they expect to learn, their aims for the future and the teachers approaches to teaching (Entwistle, 2003). The students’ experiences further indicates that this relation is domain specific, i.e. the relations are constructed within a specific context, a study program or

a class. The differences between the first and the latter cohorts can also be related to other studies of the first year in study programs with large study groups. These results show that the organising and management of classes and programs are of vital importance for the students' perceptions of the relevance and quality of a course (Entwistle, *ibid.*). Our results show that the interventions by faculty and study board, to facilitate the study work and make the study context more welcoming, was met by some ambivalence by the students. They appreciated the support and to be "taken care of", but at the same time they anticipated that the status and image of the study program would be deteriorating. They also had a feeling that the liberal attitude hid an agenda, that sooner or later they would be expected to pay a price.

The formal stage: The students actively look for formal instructions about study technique, study guide lines and assessment criteria. Faculty and peers become important role-models, especially for students with a non-academic background. The students monitor course alignment, the consistency between what is said and done, and this guides their approach to learning (Biggs, 2003; Marton & Säljö, 1997).

In this study this is evident in the students' descriptions of what they had learned the first year. Learning the ropes through monitoring the actions and attitudes of faculty and senior students became difficult when the curriculum was changing. This was most evident in the cohort of 1999 and 2002, when two new courses were implemented, the foundation course in mathematics (1999) and the CDIO project course (2002). In these new elements the students had to rely on themselves and on their peers and therefore the experiences of working together in a group became vital for their approach to learning.

The informal stage: During the first stages the main goal for the student is to "learn the ropes" of the academic context in general, and of the specific study context of a program and a class in particular. In parallel to this learning the students are creating a personal, informal platform. Small groupings are created where the students have (or have not) a belonging. In the way these groupings are classified, implicit cultural values are enacted, and the status and ambitions of individual students are confirmed or challenged (Twale & Kochran, 2000).

In this study this is evident in the students' perceptions of the norms and criteria that guided the sub groupings of the classes. In 1998 it was a norm of excellence and in 1999 a norm of attendance that were the guide lines and the students were either complying or resisting this, defining themselves as "excellent" or "not excellent", as "attendants" or "non attendants". In 2000 it was a norm of normality and balance and in 2002 a norm of structure and self-discipline that were the guiding lines defining the social identities of the students. In the first cohorts the study group and the peer group were support groups, but became more referential to the individual student, a point of reference for her/his self-assessment in the latter cohorts.

The personal stage: Every student creates their social identity as a student and/ or as a professional. How this is enacted depends on what the student identifies with, as well as her/his self-image and prospects for the future.

In this study this is evident in the influence of an overall social and economic context on the students' approaches to their studies and to their future. The students who strongly identified themselves with a non academic context were most prone to make all the necessary sacrifices in order to become a Graduate Engineer in order to secure a different or better future for themselves and their family. The students who strongly identified themselves with an

academic context were prone to work hard in order to secure a position as a student, for the time being, and they were very confident that “things would sort themselves out” in the future.

During the 4-5 years that it takes for a student to graduate from a study program, most students develop a distancing approach to their study context and to their student roles, in favour to an identification with a professional context and professional roles. Students tend to be more critical and negative to their study context by the end of a program (Rautopuro & Vaisanen, 2000; Pancer & Hunsberger, 2000; House, 1999). If a study program shall contribute to the students’ identification with a future professional role, Weidman et.al (2001) argues that the curriculum must be of such *relevance* for the students so he/she is prepared to invest time, money and commitment. It is also important that students are actively involved in the study context and in professional activities.

It is the students’ aims and goals that guide their perceptions of *relevance*. Progression, application and an increasing specialisation contribute to the students’ confidence that they can meet the professional requirements of potential employers after graduation. Identification with a professional role contributes to the students’ willingness to invest time, money and commitment to reach their goal of becoming a graduate engineer. A strong identification with a student role can make a transition from student life to working life more difficult. Their willingness to invest time, money and commitment is based on their goal to remain students and belong to the study context.

In this study the somewhat surprising and also contradicting results from a comparison between the first and the latter cohorts could be interpreted as an enactment of the students perception of relevance in relation to their personal aims and goals, but also to the situation on the job market. The first year was perceived as “a necessary evil”, a preparation for the interesting classes. The first year was also perceived as “a test”, a self-referential test. For the students in the first cohorts this was experienced with a reference to their perceptions of their capacity to graduate and to manage the work-load, while for the latter cohorts the reference was to their perception of what the program had to offer them in their personal and professional development.

THE EXPERIENCES OF THE SECOND - FOURTH YEAR.

These results are based on a conference proceeding (Jungert, 2006)

Study satisfaction

Contradictory to the Finnish study by Rautopuro & Vaisanen (2000) the students in this study were more satisfied with their studies over the years (Table 3). This can be explained by the design of the study, an effect of the self-selection, that those remaining in the program, and thus responding to our questionnaires and participating in our interviews, were the “successful” ones. An other explanation is that after two years the students had the opportunity to choose profile courses out of their own interest, which increased their feeling of relevance and usefulness.

Table 3: Percentage of students who were very satisfied/ very dissatisfied with their studies after year 2 (Q4), year 3 (Q5) and year 4 (Q6)

	Very Satisfied %			Very Dissatisfied %		
	Q4	Q5	Q6	Q4	Q5	Q6
Cohort 1998	62	71	71	6	9	10

Cohort 1999	61	58	81	9	15	5
Cohort 2000	52	53	68	13	9	8
Cohort 2002	64	66	-	11	6	-
Total	60	63	73	10	10	8

Average working hours and perceived workload

In the questionnaires the students were asked to estimate their average working hours/week. They were also asked to indicate how they perceived the general work load. In Table 4 we can see that the average working hours differ over the years within the same cohorts, but also between the cohorts, within the same study period.

Table 4: Students' estimations of their average working hours per week during year 2 (Q4), year 3 (Q5) and year 4 (Q6).

	< 40 hours %			40 hours %			> 40 hours %		
	Q4	Q5	Q6	Q4	Q5	Q6	Q4	Q5	Q6
Cohort 1998	11	9	28	42	25	33	47	66	39
Cohort 1999	14	19	26	42	14	56	45	67	19
Cohort 2000	20	20	45	41	29	32	39	51	24
Cohort 2002	11	13	-	53	43	-	36	45	-
Average	14	15	32	44	26	40	42	60	28

The students in the first cohorts, 1998 and 1999, studied more than 40 hours per week during the second, third, and fourth year. In all cohorts the third year (Q 5) was considered the toughest. although there is a difference between the cohorts. In the cohorts of 1998 and 1999 more than 65% of the students worked, on an average, more than 40 hours/week, while in the cohort of 2000 and 2002 it was just about 50%. One explanation for this difference could be that for the latter cohorts there were project courses I year three, but so did the 1999 cohort. An other explanation could be the different attitudes to studying, that the latter cohorts coped with heavy work-loads through giving priority to social/physical activities instead of "sacrificing" those. The 2002 cohort had learned a project model during their first semester and might therefore find the project course in year three easier to cope with.

The students were also asked to state, on a 5-grade Likert scale, from small to overwhelming, how they had experienced their workload, regardless of how much time they actually had been studying. Table 5 show, in line with previous table, that the cohorts of 1998 and 1999 found the work load overwhelming or very heavy, to a higher degree than the 2000 and 2002 cohorts. About 50% of the students found the workload overwhelming /heavy during year three (Q 5) , except for the students in cohort 2002.

Table 5: Percentage of students who perceived their workload to be very heavy and overwhelming during year 2 (Q4), year 3 (Q5) and year 4 (Q6) for the four cohorts.

	Q4 %	Q5 %	Q6 %
Cohort 1998	20	46	11
Cohort 1999	17	63*	2

Cohort 2000	12	47	11
Cohort 2002	22	18*	-

In cohort 2000, 47 % of the students experienced a very high or overwhelming workload, compared to 18 % of the students in cohort. Experience of work load was defined as the individual students perception of how high impact the studies had on their life and life situation as a whole. The different attitudes to their studies and to studying between the cohorts can be an explanation of these differences.

Study related health

Highly demanding studies can impact students' psychological and physical health. Ill-health can be a subjective experience, such as feelings of inadequacy, but it can also be related to physical constrains such as pain and infections. In the questionnaires, the students were asked to indicate their feelings of health/ill-health in relation to their study situation. As mentioned earlier many students had experiences of study related stress symptoms from secondary school, and that this had increased in the latter cohorts. As a whole the students' estimated their health as good and there were no significant differences between the cohorts. But when they were asked to comment on their personal experiences of pre-defined study related troubles many students reported feelings of inadequacy and of depression. Feelings of inadequacy were highly related to the third year, when the work load was high. The cohort of 2002 was in general more confident compared to the other (see Table 6).

Table 6: Percentage of students who to some extent have experienced “feelings of inadequacy”

	Q4 %	Q5 %	Q6 %
Cohort 1998	54	70	59
Cohort 1999	61	68	51
Cohort 2000	68	63	46
Cohort 2002	43	55	-

As there are studies indication that feelings of depression are increasing among young adults (Hallsten; Bellagh, & Gustafsson, 2002; Wenemark et.al, 2003), we asked the students to tell if they had such experiences. The percentage of students who sometimes were feeling depressed was relatively high, but with a variation between the cohorts and between the years (Table 7). The cohort of 2002 had a significantly smaller percentage of depressed students and they also differed from the other cohorts with regard to perceived work load, working hours/week and feelings of inadequacy.

Table 7: Percentage of students with experiences of feeling depressed.

	Q4 %	Q5 %	Q6 %
Cohort 1998	42	66	47
Cohort 1999	46	56	47
Cohort 2000	61	70	56

Cohort 2002	41	38	-
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As mentioned before, feelings of social isolation can be related to the situation, e.g. a student may have many relations outside the university and have problems feeling at home in the academic world, as well as to relations, e.g. a students may find it difficult to establish contact with other students. In both cases, a dominant feeling may be of not really fitting in. Research has shown that social integration, which involves the structural aspects of social relations (House & Kahn, 1985), is more important than academic integration, for most students, and that lack of experienced or actual social support and social support networks is a significant reason for student drop outs (Wilcox et al., 2005). The results from this longitudinal study indicated that the 1998, 1999 and 2000 experienced social isolation during their *first* semester to a greater extent than cohort 2002, who experienced a higher degree of social isolation during their *second* semester (Edvardsson Stiwne, 2005b). Cohort 2002, which was the first cohort where all students were assigned to a project group during their first semester and that might have contributed to a feeling of belongingness, but after the project work these groups were dissolved and that may have contributed to a feeling of being left to ones' own initiative. In the 1998, 1999 and 2000 there were no organised group work the first years.

Experiences of influence and cooperation

Research has shown that teachers' support, friendliness and fairness impact the students study motivation and that support from teachers increase students' possibilities for social integration (Wilcox et al., 2005). The students rated their possibilities to influence their study situation as fairly high (2.9 - 3.3 on a five grad scale) with no significant differences between cohorts or between the different school years. The students in the 2000 and 2002 cohorts rated their possibilities to cooperate with peers higher than the 1999 and 1998 cohorts, and the cohort of 2002 rated this highest, but they also were the students who had an experience of organised work in project teams and who had learned a specific project model, LIPS.

Thoughts about taking a study leave

Taking a study leave, for a shorter or longer period of time, is one way for students to get a break and do something else. In the questionnaire the students were asked if they, during the actual study period, had *considered* taking a study leave, which quite few of the students in cohort 1998 had done, compared to the other cohorts (Table 8).

Table 8: Percentage of students who had considered taking a study leave sometime during year 2 (Q4), year 3 (Q5) and year 4 (Q6)

	Q4 %	Q5 %	Q6 %
Cohort 1998	22	20**	14**
Cohort 1999	59	43	48
Cohort 2000	74**	53**	53**
Cohort 2002	57	34	

On the other hand, had cohort 2000 considered these options to a significantly higher extent than the other cohorts. One explanation could be that students in cohort 1998 to a greater extent dropped out at the beginning of the program. From 2000 and on the study board had made great efforts to give support to the students from the start with the aim of reducing drop out, and as we have reported earlier, the attitude to their studies and to studying had changed. The reason *why* students to a higher degree prolongs their studies must be further analysed and discussed. Tinto (1987) argue that doing everything to keep students in a program is not

an academic task, instead focus should be to develop an ability among faculty to provide such a stimulating and challenging study context so that the students choose to stay. But Tinto (ibid.) also argues that temporary study leaves, periods of reflection and recovery, should be regarded as “normal” study behaviour and not as personal failures. In the interviews the students in our study argue that they have to take a study leave to get their motivation back and to get some work life and life experiences into their rather restricted and sometimes narrow minded study context.

Experiences of learning content and context

In the questionnaires, the students were asked to name which courses they had found the most as well as the least instructive and to give a motivation to their choices. Entwistle (2003) claims that student perceptions of the relevance and quality of a course depend on how the programs are organized and managed. Lizzio and Wilson (2004) found in a study that the perceived relevance to future work was the strongest predictor for students’ interest in courses and also impacted the amount of effort they were willing to invest in those courses. If courses are perceived to be relevant for the individual student, intrinsic motivation can be increased (Ryan & Deci, 2000).

The motives students in our study expressed for the courses they had found most instructive support the above findings, and from these results we have categorised the courses as follows: (i) Useful, (ii) Applicable, and (ii) Interesting courses.

Useful courses. To motivate why a course was considered to be useful the students argued as follows: “...is useful everywhere”; “essential for many courses to come”; “without it you couldn’t pass any other course”; and “could use much knowledge from many other courses”. These statements indicate that students found a course instructive if it was experienced as useful in other courses in the program or considered to be of general interest. These kinds of motives were explicit for the courses Calculus, Complex Analysis, Circuit Theories, and Automatic Control Project Course.

Applicable courses. Arguments for why a course was considered applicable were as follows: “the course contains many things that are applicable in reality”; “relevant assignments”; “the course the closest to reality”; “you could apply the knowledge practically”; “closely connected to how you work in companies today”; and “clear relevance for the future”. These statements indicate that students considered a course instructive if it was applicable in their future role as an engineer. These employability motives were explicit for the courses Complex Analysis, Automatic Control, CDIO-Project Courses, Digital Signal Processing, and Computer Hardware and Architecture.

Interesting courses. How the students characterised interesting courses were as follows: “Interested in the subject”; “of general interest”; “fun”; “stimulates one’s own thoughts and creativity”; “you learned a lot and it was great fun”; and “interesting contents”. For a course to be instructive it has to be associated with some joy, fun and challenge in relation to an interest in a subject. These kinds of motives were explicit for the courses Computer Hardware and Architecture and CDIO-Project Courses.

The third year project course in Electronics, which is a CDIO- course introduced for the first time for the 1999 cohort, was by far the course considered to be the most instructive course in the cohorts 2000 and 2002. The motivations were that it considered applicable as well as interesting.

EXPERIENCES OF JOB SEARCH AND ENTRY INTO WORK LIFE

One main goal of the CDIO-project, as well as in the Bologna process, has been to focus on the students' employability through the integration of generic skills and competencies into a broad, theoretical graduate engineering program in Applied Physics and Electrical Engineering and in the construction of an open and supporting study environment (www.cdio.org). From the end of 1990ies the overall job market in Europe has shown an increasing difficulty for young adults to get into the regular job market, and this is also true for the graduate job market. During the same time enrolment rates in Swedish higher education have declined, especially in science and engineering.

After having completed all interviews we read them through with the following questions in mind, related to the above mentioned goals. Do engineering students, during their education, their job search process and in their first jobs, reflect on their career and/or future employability? Do they think of themselves as "employable" subjects and do they consider their future employability in their study and life choices? If they do, when and how does this take place?

In order to answer these questions we analysed all interviews with students in each cohort who had been interviewed 4-7 times in total (Edvardsson Stiwne, 2008). All of them had been interviewed during their job search and transition period. Listed in table 9 are students interviewed 5-7 times in cohorts 1998 and 1999 and students interviewed 4-6 times in cohorts 2000 and 2002.

Table 9. Students interviewed 4-7 times

Cohort 1998	Cohort 1999	Cohort 2000	Cohort 2002
Male born 1967	Male born 1977	Male born 1980	Male born 1981
Male born 1978	Male born 1979	Male born 1981	Male born 1981
Male born 1978	Female born 1972	Male born 1982	Male born 1982
Female born 1978	Female born 1980	Female born 1978	Male born 1983
Female born 1978	Female born 1980	Female born 1980	Male born 1983
Female born 1979		Female born 1980	Female born 1982
			Female born 1982

No articulated career plans during the first two years

These results are based on a conference proceeding (Edvardsson Stiwne & Jungert, 2007). The Engineering students were young when they enrolled. The average age of the first year students in our study was 20 years. In the first cohorts there were more mature students, who had been working, studying, doing military services etc. before enrolling, and therefore had some work life experience and experience of managing their own lives as adults. When they chose and enrolled in the Y-program, very few of the interviewed students had any idea of what an Engineer was or what they were doing. They had no articulated career plans or plans for the future. Exceptions were mature students who saw further education as a way out of shop floor or other unqualified work.

The lack of career plans for the future was enacted in different ways. One way was to engage in activities aiming at confirming their position as engineering students, i.e in engaging in

student union activities and extra curricular activities. During the first years they held the attitude that

“I am going to spend five years of my life in this program and I want to have some fun as well”.

These students had some difficulties in balancing study work and social life and the other activities contributed to prolonging their study time. Another way was to see the Y-program as *one* option among others,

“I will try one year and if it does not feel right I will do something else”.

A third option was to focus on a specific subject of interest and on the reputation of the program

“I loved mathematics and I wanted the best, the toughest “,

without any thoughts about a future job. But during the third year, which was the toughest and most demanding for at least the cohorts of 1998, 1999 and 2000, the choice of a profile for specialisation became a turning point when they had to make some strategic choices (or not).

Turning points: Choosing a profile and inquiring for a grade project

Choosing among many elective courses was a situation that was regarded as a crucial point in the students study lives. The class of origin that they had been associated to during the first years was dissolved, and in the interviews the students talked about their considerations during this phase in their studies. Taking a study leave after the first years, to think things over, was one option for many students. In considering their choices the core question was if they should choose entirely out of interest in a subject or from the reputation of the course and teacher or should they make strategic choices, courses that might make it easier for them to get an interesting grade project and maybe a job offer? Among the interviewed students four different strategies could be identified, with different focus on their future employability or employment.

1. *Exit or time out.* For those students who had experienced an overwhelming work load and an approach to teaching and learning based on the cramming of facts and passing examinations while they themselves had other expectations this was the time to take the decision of either leaving the program (exit) or taking a study leave (time out) to think things over and to something completely different, to leave the study context for a while (Edvardsson Stiwne, 2006).

“Sometimes I have felt I want to do something else, I do not know if this is the right thing but I cannot think of anything else.. I have never really known what I want..It is interesting with maths and technology and I enjoy studying but I have never had the idea that I shall become a graduate engineer.”

Considering this option was experienced as quite painful and also a bit shameful. A feeling of failure lured behind and the students had to justify their choice

“I do not think the time has been wasted, even if I quit, because it will be useful somehow, but I do not know when, where and how..I have learned to study, it is very much problem solving and logical thinking and stuff like that you learn..many graduates choose one profile and end up doing something quite different..”

2. *Deepening an interest.* Some students saw this as an opportunity to engage in deeper studies of their favourite subject, with no consideration of a future job or career, just pure interest.

“I plan to take medical technology as my profile but I do not exactly know what it means, what kind of jobs it can lead to”.

3. *A doorway to a job.* For many students this was considered the time to take strategic

decisions about their future job and career opportunities

“I changed my profile from a quite theoretical to a more applied with respect to a future job market”.

Even if many students did not have explicit career plans when they chose their profile courses, they soon had to face another crucial decision point when they started inquiring about a placement for their graduate project/thesis. The students were convinced that a good placement would be a doorway to a graduate job, or at least to contacts and networks that would result in a job after graduation. In the interviews many students commented that it was during this grade/thesis project process that they started to think about, and became conscious of, their overall employability skills as well as the lack of those! In working with their grade projects it also became evident for them that work-life conditions were quite different from study-conditions, regarding autonomy, possibilities to influence their personal work-conditions and time-management as well as the composition of work teams.

”What was new maybe was that you could work more independently and decide when you had done something ‘good enough’ to be finished. I was the one with the answers, no teacher or key person”

Apart from employability, one goal in the Bologna reform process is to increase mobility among staff and students and to increase the internationalization of higher education. In order to relate these goals to the students’ employability, students in the latter cohorts (2000, 2002) were encouraged to look for thesis projects in firms abroad to a higher degree than before. The tradition in Sweden had been that most students relied on projects at the University or in the public sector.

The interviewed students looking for grade projects in the public sector, where the University is one actor, were interested in the pursuit of a career as researchers. They also found their profile courses relevant for their grade thesis. Students who did their grade projects at firms and companies were tired of being students and looked forward to be employed. They did not find their profile courses so relevant for their work. Among the interviewed students there was a shift in strategies between those enrolling in 1998, 1999 and those enrolling in 2000, 2002. There were more students doing their grade project in private firms and companies in the latter cohorts, and there were more students doing their grade project abroad. An academic career, as researcher and/or teacher was not an attractive option for the students in general

“remain here for the rest of my life??!! I want to experience the real life..it’s like a lot of strange people inhabiting this place.”

The job search process

The job search process was considered very demanding by the interviewed students. Sending in between 30- 50 applications, attracting 100-200 applicants and then be invited to, at the best *one* job interview, could make the most enthusiastic person depressed. But there was also some ambivalence in engaging in the job search process, as this also meant that the students would be evaluated and tested and reminded of the fact that soon they would have to leave their safe and comfortable study life. The insecurity of economy and of not knowing what would happen the next months was considered very stressful.

“I have lived in a small but secure world at the University and it is a bit scary to get out and see if I can live up to the expectations of my grade”.

For some of the students it was an option to take a low qualified job, to start with, just to get some work experience. This was, however, not an option for all students:

“If I cannot get a job, I will take more classes, but most of all I want to leave the Campus. It is a feeling of defeat to get a low-qualified job after graduation, so I will rather continue studying than just getting any job, despite loss of income”.

For those students, who did not have to worry about economy, there was no hurry in the job search. To continue studying was a more secure and familiar way of living

“There are other students from the Y-program that were not too keen to start working, who now are studying economy. The reasons are that they do not want to start working is that they enjoy studying and that they believe that more credits will enhance their job prospects”.

Werbel (2000) suggested that readiness and action were key concepts in the job choice/search process. In our study we can see that readiness meant different things for the students.

1. Readiness, as being confident in ones' competencies and experienced, was articulated by a few students.
2. Readiness as being tired of, and fed up with, being a poor student and treated like a student, was articulated by some.

In our data we can also find a third category

3. Lack of readiness. The students who, for various reasons, hesitated to leave the study context and study life. To them, the situation of being, an adult with full responsibility for their own support, was frightening and challenged their image of themselves.

The motivation to go from the study context into working life, varied among the students, within as well as between cohorts. One important reason for the variation *between* cohorts is the situation on the job market as a whole. From our survey data we can see that about 90% of the students in the 1998 and 1999 cohorts responded that they had been motivated to start working after graduation, but almost 70% had found it very difficult to get a job. This can be compared to the 2000 cohort where about 60% had had *no* problems in finding a job after graduation! The situation on the job market was changing by the end of the 1990ies, as well strategies for recruitment and employment. Net-working, career-centres, career-counselling and hiring of staff on short time-contracts became more common, in contrast to the “Swedish model” of high employment security and public job centres. The proportion of graduates who got their first job through their thesis project increased from around 25 percent in cohorts 1998 and 1999 to 37 percent in cohort 2000. In the free text responses in the surveys the students comments showed that it was quite common that the students in the 2000 cohort were offered a job before they graduated, usually where they had completed their thesis project.

Becoming an employee, becoming employable

As mentioned earlier, employability can be defined as the amount of students in a cohort who have an employment within a specific time after graduation. The Swedish Council for Higher Education (HSV) annually presents a report regarding the graduate employment rates. The study is based on data from Statistics Sweden (SCB). The definition of the degree of establishment on a job market is that one year after graduation the student should have a job with a minimum income of 160.000 Swedish crowns/year (i.e. about 16.000 Euros). On an average the degree of establishment varies between different subject areas, i.e. 90% (medicine and health care), 80% (engineering), 50% (arts and sciences), but also between universities within the same subject area. In the surveys of our study, 56 percent of the 1998 cohort held a position as a graduate engineer in their first job after graduation, compared to 80 percent in the 2000 cohort. In both cohorts 18 percent started an academic career as a doctoral candidate.

Several studies show that a general tendency is that casual jobs, projects and time limited on probation jobs are being more frequent on the Swedish job market (Allvin, 2006) although this does not seem to be the case with the engineering students from the Y-program, since 71% percent in the cohort of 2000 held permanent positions, compared to 58 percent in the 1998 cohort. Casual jobs and project jobs were *less* frequent for the students in the 2000 cohort although jobs on probation had increased.

Another definition of employability is that the students, after graduation, have achieved “*skills, understanding and personal attributes that makes graduates ore likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy*” (Yorke, 2006). I their final interviews the students commented on what skills and competencies achieved during their studies they considered to be most valuable in the *job search process* :

- ✓ having done a good thesis project
- ✓ to have a diploma from the Y-program proving that they have been able to manage a tough study program and to manage a heavy workload
- ✓ self confidence in knowing that they could solve complex problems and that they possessed broad knowledge base.

When asked what he most valuable skills and competencies were *in relation to the present job situation* they gave different answers. They highlighted, mathematics and subject specific knowing and learning, problem solving competencies, ability to manage time, ability to learn new things and to manage stress and heavy workloads. In the last questionnaire (Q7) the students rated to what degree they believed their acquired knowledge and skills in specified areas like problem solving, co-operation, working in projects, managing projects, managing a heavy workload, critical thinking and information management were useful and transferable to their present job (Edvardsson Stiwne & Jungert, 2007).

Problem solving was rated as the most valuable skill by more than 90 percent of the students in all cohorts. The ability to think and critically was rated as very important by 78 percent in the 1998 cohort, while it was less valued by the cohort of 1999 and that tendency continued in the cohorts of 2000 and 2002 as well. These responses are not unambiguous. Critical tinkng is a key concept in academic education. Do these responses indicate that after 1998 the students have not learned the skill of critical thinking or do they indicate that critical thinking is not a valued skill in the world of work?

Learning analytical reasoning, good problem solving skills and information management were skills learned in the program that the students in all cohorts valued highly, but information management was valued to a higher degree by the 1998 and 1999 cohort. The reason for that could be that the 2000 and 2002 cohorts had project courses in curriculum and were encouraged to work in groups/teams. They learned how to share information and to collaborate with other people in project teams. These curricular changes can also explain the difference between the cohorts regarding the value of having acquired skills and competencies in working in teams. 60% of the students in the 2000 cohort believed that their co-operative skills and competencies were useful in their present job, compared to about 30 % in the 1998 and 1999 cohorts. What we cannot say anything about is if these differences are due to the fact that they do not consider these skills important in their present job or if they do not consider themselves to hold these capacities. The same question arises when it come to how they valued their capacity to manage projects. Although the capacity to *work in projects* was highly valued by the 2000 and 2002 cohorts the capacity to *manage projects* did not hold the

same value. From results it looks as if team-work competencies were not so important in the kind of first-jobs they got after graduation.

The reputation of the Y-program as tough and demanding was by many students regarded as a challenge in it self, and in all cohorts the students commented that this was a core value of the program, something that made the Y-program stand out from other programs. Graduating from the Y-program was a quality indicator in itself, ensuring an employer that it was an enduring, smart and hard-working employer they would get.

Vaatstra & de Vries, (2007) showed that graduates from *activating learning environments* attributed more generic and reflective competences to themselves than graduates from conventional learning environments. The students perceptions of a relation between a high quality of contents of majors and of curriculum design and the development of generic and reflective competences, such as ability to learn, analytic competences, working independently and working in a team positively contributed to the feeling of competences in the later careers of graduates. Ng & Burke (2006) indicated that students taking part in cooperative education had more realistic expectations, better self-insights into their own abilities and desires, and reported higher self-confidence than non-cooperative students.

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