

The ethos of a study program - a barrier or a springboard for change?

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ABSTRACT

In Sweden, as in many other European countries, vice chancellors and study boards are trying to interpret and adjust to different programs, aiming at enhancing and developing the quality of education. The CDIO-initiative was launched at Linköping University (LiU) in 1999, in Applied Physics and Electrotechnics (the Y-program), in collaboration with Chalmers and KTH in Sweden and MIT in USA. The initiative was possible due to a generous grant from the Knut and Alice Wallenberg foundation in Sweden (www.cdio.org). In 2007 the implementation of the Bologna structure started at LiU, to some extent in line with the CDIO-initiative, but with a clear focus on learning outcomes at course - and curriculum level. In their national evaluations of Engineering programs in Sweden, The National Agency of Higher Education (HSV) based their quality criteria to a large extent on the CDIO-syllabus.

In this paper I will reflect on the meaning and impact of the “ethos” in a study program. I will review previous research and try to make a distinction between the two concepts, “culture” and “ethos”, which sometimes are used synonymously. With that background I will use results and experiences from the change process in the Y-program to reflect on the question of the relation between the “ethos” of a study program and the potential for curricular and pedagogical change. The questions underpinning the outline of the paper are:

What is the meaning of the concept of “ethos” and how is that related to the concept of culture?

Are there previous research about the concept of “ethos” and its’ impact on student learning?

What was the “ethos” of the Y-program and how was it enacted and sustained?

Is the “ethos” of a program a springboard or a barrier for curricular and pedagogical change?

Conclusions

KEYWORDS

Ethos, culture, curricular change, pedagogical change

Background

In changing the curriculum of a study program the question is emerging of what an “ethos” or a “culture” is and its’ impacts on the change process and student learning.

In Sweden, as in many other European countries, there is a great concern about the declining interest in science, mathematics and technology among young adults, the decline in enrolment rates in HE regarding these subject areas and the high drop out rates early in the education in these programs. These issues were the background to a longitudinal study at Linköping University (LiU). (1; 2; 3;)

In 1998 the study board of the Y-program, initiated a study with the aim of inquire into the students self reported experiences during the first year. The program was marketed as “the toughest” Graduate Engineering program in Sweden and the attrition rate was high but so was also the drop out rate. The study was initiated in order to give the study board some idea of what the problem was. Both students and lecturers were dissatisfied and the drop out rate was *one* indicator of this dissatisfaction.

The results of the study showed that the students were very motivated, experienced an overwhelming work-load but were prepared to work hard and sacrifice a lot in order to manage, but faculty believed that the students did not work hard enough and that they were not qualified for the studies. The results were met with some discussions, but were considered to be of such interest and value for further development of the curriculum, as well as for the improvement of the program, so the project was expanded to encompass the students experiences through the whole study program of 4 ½ years and with a follow up one year after their graduation. In 1999 plans were made to transform the study program from an “elite”- program to a high quality project- based learning environment, where engineering skills would be in focus. These changes were in line with the goal of an international development project, CDIO (www.cdio.org) that Linköping University and the Y-program were involved in, in collaboration with KTH and Chalmers in Sweden and MIT in Boston. In order to monitor the implementation of planned changes it was decided that the study would encompass four cohorts, those who started in 1998; 1999; 2000 and 2002. Data from the first cohorts (1998 and 1999) were defined as base line data in the study against which the results from the latter cohorts (2000 and 2002) could be compared, with respect to the rolling assessments of the implementation of a CDIO curriculum. Between 1998-2002 the percentage of enrolled, female students varied between 13-20%. During the first two years about 40% of the students dropped - or stopped out (taking a study leave for longer or shorter period of time), but the percentage of female students remained stable in each cohort, despite the drop out.

Three main issues guided the design of the study:

- a) The students experiences from college and their expectations when they started the Y-program
- b) The students experiences of the curriculum and study environment at different times during their study period
- c) The students’ experiences of how the program had contributed to their employability and prepared them for their professional lives as graduate engineers.

The Y-program is *one* of several graduate engineering programs at LiU. The employment rate of engineering students who graduated in 2001/2002 were about 81% and about 70% among those who graduated in 2002/2003. The employment rate is, on an average, high at LiU, compared to other universities in Sweden (4).

What is the “ethos” of a program and how is that related to the concept of culture?

The concepts of “ethos” and “culture” are sometimes used synonymously. In this paper I will define the *culture* of a study program or an educational environment, as an all-pervasive system of beliefs and behaviours enacted in a specific educational context. It specifically consists of the set of values and norms or rules held by staff and students together with its material expressions (5). In management studies the concept of *corporate culture* is widely used to describe key factors that are assumed to enhance competitive performance through employee commitment and flexibility (6). In an educational context, only staff are employees, while students have more of a customer/client relationship with the department. Employees in “strong cultures” know what is expected of them, identify with the culture and take pride to be part of it. Different kinds of people experience different fits with a culture. For the same individual, one culture can promote his/her achievement, self-confidence and self-esteem but another culture can contribute to his/her feelings of failure and lost self-confidence and self-esteem and even stress and ill-health. If the culture is strong, people do not need orders or rules because there are social norms and values that are internalised and people are self-motivated (7). Thus, “*culture is not something an organisation “has”, it is created in daily interactions in a specific context.*” The mission of an engineering program is teaching and learning and this is performed in an academic, educational context, which students are dependent on for several years, in order to get their degree. Students learn both from formal curriculum and formal/informal interactions within a study context with explicit/implicit norms and values (culture). The organisational culture can impact the creativity and potential for change, or stability, in an organisation as well as for individuals (8), i.e. individual as well as organisational learning. Argyris & Schon (9) argue that organisational, collective, learning can be defined as single- and double-loop learning. Single-loop learning takes place *within* existing systems of values and norms, which create an action frame, while double-loop learning *involves changes in values and frames* which calls for reflection and inquiry. Some researchers argue that single-loop learning is merely a form of adaptation to existing values and that the concept of learning should be reserved for double-loop learning.

To summarise: The culture of an organisation impacts and directs people’s way of thinking and acting in a specific context. If the underlying values and norms are *not* changed curricular or pedagogical changes will usually be restricted to form, content and complied actions, and thus become more of performed rituals than changes and learning. Policies and artefacts change but in every-day actions business is as usual. Research on the Bologna process shows an example of this, as policies and curricula have been reformulated, but teaching and assessment has not changed (10).

From wikipedia we can learn that ethos is a Greek word meaning “accustomed place” and that the word forms the root of ethikos, meaning “moral, showing moral character”. The meaning of it is “the state of being”, the inner source, the soul, the mind, the original essence, that shapes and forms a person, group or context.

From that definition the “ethos” of a university, a department or a study program can be described as the spirit or soul that people *believe is* imbuing a context, i.e. a place, an organisation or a relationship, or what they *want* it to be imbued with. Thus “ethos” can be defined as an idea, a representation or imagination of a context that will impact the world, in one way or another. The “ethos” can thus be imagined and narrated and sustained in artefacts, narratives and rumors by different actors, even those who are not directly engaged in, or involved in the physical interactions in the context, while the “culture” is created, sustained or changed in the way people and artefacts interact.

If the experiences of individual students and staff, in a study program are that their conceptions of the “ethos” are *aligned* with their experiences of the “culture”, they will contribute to strengthen this. A strong culture, based on a strong ethos can be a barrier for double-loop learning and change of values and norms. Attempts to change values and norms can be conceived of as attacks on the heart and soul of the “ethos” and even as a war where groups are turned against each other. If the experiences are *dissonant* with the expectations

of students and staff, they will exit, voice or stay and comply, maybe at a very high personal price (11)

To summarise: "Ethos" is an idea, a representation or imagination of a "state of being" that can be a spring-board for change but also a barrier, depending on the fit between the "ethos" and "culture" in a specific context.

Previous research about the meaning and impact of "ethos" in educational contexts

There are some studies done where researchers have investigated the relation between students/staff experiences of their study/work environment and their achievement, study/job satisfaction and health. In some of these studies the concept of "ethos" is used explicitly, while in other studies use the concept of "culture", "climate" or "habitus" is used.

Astin (12) conducted a longitudinal study between 1985-1989 of about 200 universities/colleges and more than 25.000 students. The aim was to understand how college environment and college education affected students. The results showed that the following aspects impacted the outcome of students' academic achievement and development (12)

- Student involvement was beneficial for different student development outcomes
- Hours spent studying was positively related to nearly all academic out-comes
- The amount of interaction among peers had far-reaching effects on nearly all areas of student learning and development
- Peer group and faculty represented the most significant aspect of the student's undergraduate development.
- A strong research orientation of academic staff had a substantial negative effect on student satisfaction with faculty.
- A strongly student learning-oriented faculty contributed to the affective and cognitive development of the undergraduate.

From these results Astin (12) reflected on the design and organising of academic work. As there were no inherent contradiction in a faculty member's being both research oriented and effective in teaching the problem seemed to reside in institutional policies; most institutions that hired large numbers of research-oriented faculty gave little priority to effective undergraduate teaching. Another reflection was that the form and content of the general education curriculum made little difference for student learning, instead it was *the manner in which curriculum was implemented* that seemed to be much more important therefore the traditional institutional approach to curriculum development must be changed. Curricular planning efforts resulted in greater payoffs in student outcomes if there were less focus on formal structure and content and more emphasis on pedagogy and other features of the delivery system. His conclusions were that what really matterd was if faculty were willing to consider the possibility that the student's "general education" consisted of something more than the content of what was taught and the particular form in which that content was packaged. Although the HE context has changed since the 1980ies, it is worth reflecting on the conclusions that it is underlying values and norms in the organisation, enacted in an emerging culture that directs peoples ways of thinking and practicing.

Based on results from an other longitudinal project, DEEP (Documenting Effective Educaitional Practices) Kuh (13) argue that a key factor that must be considered in fostering student learning is an institution's ethos which he defines as " a *belief system* widely shared by faculty, students, administrators, and others. It is shaped by a *core of educational values* manifested in the institution's mission and philosophy". With reference to Geertz (14) he means that ethos creates "a sense of intrinsic obligation: it not only encourages devotion, it demands it; it not only induces intellectual assent, it enforces emotional commitment". The results indicate that colleges with a salient ethos imprint on their students a distinctive pattern of attitudes and values. By talking with students some of these distinctive imprints were identified (15). At institutions marked by an ethos of learning, the tension between cohesion

and accuracy must be recognised because that tension indicates that the organisation has successfully resisted the press for conformity. How an organisation responds to conflicts between individualism and conformity is a key indicator of whether an ethos of learning exists (16). A salient ethos can be a double-edged sword, according to Kuh (13). Such an ethos creates a psychological culture where the majority of students see things in much the same way; they sense the importance of succeeding--to achieve, persist, and graduate. On the other hand, students with motivations and aspirations that differ from those of the dominant group may have trouble adjusting. The ethos can have debilitating effects when some group members are silenced or alienated by the values of the ethos. That these select group members feel uncomfortable is, partly, a historical artifact and product of where, by whom, and for whom the program was established.

In the 1980ies researchers reflected on the relation between the ethos of an institution and its' propensity for change which can be of interest in 2009 when ranking and competition contribute to a discourse about quality and change.

" The changing nature of college students and an increasingly pluralistic world demand that colleges change to accommodate and welcome students for whom the institution was not originally designed. But can a college develop and maintain a salient, coherent ethos while attracting and affirming students from diverse backgrounds? It is beyond the scope of this article to answer that. But the implications for institutional renewal are significant, beginning with asking faculty to examine their assumptions about who belongs at their college and which students can learn what. At colleges marked by an ethos of learning, faculty communicate to all students that they are full members of the campus community and are expected to succeed. Unless faculty agree that all students can learn what they teach, then they will transmit signals of belonging to some groups and rejection to others" (13).

Conclusions from the project were that institutional ethos contributed to desirable changes in students when it permeated every aspect of campus life, including students' experiences outside the classroom. The institution's ethos also could explain why certain groups of students had affirming experiences while others felt alienated in "the same" context.

In a study of a primary school in Northern Ireland Donnelly (17) showed that school ethos, defined as observed practices and interactions of school members, departed considerably from the school ethos defined as those values and beliefs the school officially supported. Her study focussed on how staff perceived the ethos. Donnelly (17) argue that both culture and ethos are abstract concepts related to the actions of people within a specific context, but she argues that ethos is subsumed within the broader concept of culture, which is contrary to the position taken in this paper, where culture is assumed to be subsumed in an ethos. One conclusion drawn from the study was that what was understood as "ethos" was both superficial and contradictory. Ethos can not be defined either as an objective phenomenon or a social process, but as a process characterised by contradictions and inconsistencies. What directions a change process takes, depends on the key actors involved, their values and attitudes as well as the dominating social and political culture. School ethos can constrain people to adapt to the prevailing regime, but also enhance resistance and opposition. Ethos can be defined as a negotiated process whereby actors come to some agreement about proper actions.

Smith (18), a researcher in the sociology of education, argues that ethos can be defined as the habitus (19) of an organisation and that habituses external to an educational context provide dispositions that continuously construct and re-construct its' ethos, which provides the context for situated learning (20). He uses the concept of "ethos" instead of "culture", arguing that the concept of culture mainly is associated with, an used in non-educational organisations, while "ethos" is "reserved" for schools and kindered organisations. From a

neo-institutional perspective Scott (21) sees Bordieu's concept of habitus as a matrix of perceptions and actions that allows individuals to structure their behaviour within situations. Smith (18) proposes an ecological perspective where an organisation can be understood as "the impact of cultural groups or classes on an individual's behaviour as it is mediated through an organisation". According to Smith (18) ethos can be thought of as the aspects of the culture, climate and philosophy that impinge directly upon students affective and cognitive learning and are perceived by all stake holders. It is constructed through interaction between actors and the official value system and is mediated through organisational structures and processes as well as by staff culture and competence. The durability of the ethos is evidenced by the difficulty by which it is transformed. Where there is a high degree of congruence between the ethos of a program and the class/social habitus of the majority, students of significantly different habitus may be deterred from seeking entry or they might drop out. Ethos is seen as resulting from a) the mix of values, attitudes and behaviours that students and staff bring to the context, and b) policies as expressed through curriculum and formal rules and regulations. This is enacted in social interaction and mediated by staff culture and competence in the way they construct their ideal students.

Conclusions: The results referred to above indicate that although "ethos" is an abstract concept, difficult to define and measure, it can be useful as a tool to better describe and understand student learning and other aspects of institutional functioning. To study the "ethos" of a study program can contribute to an understanding of why programs, departments or universities act and react in different ways to policy initiatives, i.e. to the Bologna process. Attracting, enrolling and graduating more female students in mathematics, science and technology, and to adequately prepare *all* students for the next century, requires a change of values and norms and double-loop learning about how the "ethos" encourages or discourages student learning and personal development. When an *ethos of learning* prevails, people perceive a pressure to think and behave *inclusively* and the goal that drives policy and practice is *unity*. However, unity as an institutional value should be distinguished from conformity and compliance, which can indicate a failure to appreciate, encourage and make use of a diverse community. If unity and diversity are to be values impinging the "ethos" of a study program, their mission and history has to be reinterpreted and they must organise their work so that a wide range of voices and a wide spectrum of diverse views and interests are acknowledged.

Was there an "ethos" of the Y-program and how was it enacted and sustained?

The results of our longitudinal study of the Y-program have contributed to an insight of how complex the phenomena of learning, motivation, employability and change in higher education are. The intention with the CDIO-project was to implement a curricular reform in order to meet the requirements from students and potential employers. The realisation of this, from policy to practice, proved to be challenging in a program that had a deeply rooted reputation of being tough and demanding, and where quality aspects were associated with this reputation. The first cohort, 1998, studied within a curriculum where these values were predominant and defended by the students, even those who failed and dropped out. These students motivation, their approaches to learning and their way of thinking about their future were aligned with an idea of a "hard-working, enduring student, sacrificing some freedom today for the dream of an interesting job and a good life in the future". The introduction 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. A "softer" approach indicated a lowering of the quality of the program and they anticipated an impaired reputation. The implementation coincided with the entrance of students (2000 and 2002) with a "new" attitude to studying and learning. These students expected to get good quality teaching and support in their learning process on their way to an academic grade, as this was considered to be a basic requirement for an entrance into the job market. They focussed on being and

living as students, they were not prepared to make sacrifices and had vague ideas about what a career as a Graduate Engineer would mean.

Summary of results from the longitudinal study of four cohorts engineering students in Linköping

The Y-program was marketed as tough and difficult and managing this was the main motivation for some of the students interviewed to enrol, for others the motivation was an interest in relevant subjects or getting a grade as an entrance to a graduate labour market. Between 150-200 students were enrolled annually in 1998, 1999, 2000 and 2002 but despite the curricular changes made 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.

Experiences from Upper Secondary School were that all students had been successful, 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 described an accelerating rush and competition for the highest grades. About 30-40% had experienced some kind of study-related stress (sleeping problems, stomach problems, feelings of self doubt and insufficiency; problems of concentrating and depressions). These experiences were gender related. The increase in students' experiences of study related stress was considered in an overall cultural context as studies of psychological well-being in the Swedish population showed that the increase of psychological ill-health was accelerating in the age group of 19-29 (young adults) (Hallsten et.al, 2002; Wenemark et.al. 2003).

The students' motives for having the Y-program as their first choice changed between 1998-2002. *In 1998 and 1999* a the motive was the students' special interest in mathematics and physics and their anticipations of a promising job market as Graduate Engineers. 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 motive was the breadth of the program as it enabled the students to postpone their career choices. The choice of study program was informed by life style and an image of the study context more than of a future job market.

There was a difference in the approaches to studying adopted, between the first and the latter cohorts. In 1998 and 1999 the students wanted to "test" their capacity to live up to the standards of the program, while it for the latter cohorts it was "a test" if the program could live up to their 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.

In 1998 and 1999 the students' described their first impressions of the academic study context as "choking", "chaotic" and "overwhelming". Managing a high tempo and tough classes in mathematics evoke much agony and self doubt. A perceived harsh attitude among faculty contributed to 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 attitudes among faculty were perceived as "helpful". The students commented that the high proportion of teacher-led lectures and lessons was unexpected but very positive. Most 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.

In all interviews the students commented on their overall study satisfaction. 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. When the Y-students compared themselves to other students they characterised themselves as more ambitious, more self-demanding, 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.

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 them as students, exemplified by comments that *some* lecturers seemed to be fed up with students and seemed to enjoy tormenting them. Another comment was that some lecturers did not bother to explain issues that they considered too simple and too evident. The students’ developed different strategies to cope with this, such as attending all lectures, selecting lecturers, working in tight peer-groups or work on their own. The students in 2002 were most positive towards their lecturers, who were considered helpful and considerate but still lacking pedagogical competence.

In all cohorts the average working hours/week were 40-50. Lectures, classes and laboratory work were highly attended to. New forms of assessment and project-work were considered interesting, but time-consuming and disturbing the “real” studies. 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”. Problem-based learning, projects and training generic skills like communication, management etc, were activities that might impact the reputation and image of the program in a negative way.

The students in the latter cohorts did not see any alternative to studying, a concept that also included activities like leaving home, fixing accommodation, economy, household duties and creating new social networks. These activities were considered very stressful during the first semester and in conflict with a tough and demanding study situation. About 40% of the students had considered taking study leaves (stop-out) during the first year, 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. and of not fitting in. The students hoped that the first year was the worse and that it would be more interesting later.

In interviews after graduation the students commented that the reputation of the Y-program, to be tough and demanding, was a core value of the program, something that made the Y-program stand out from other programs and that being a Y-program graduate was a quality indicator in itself, ensuring an employer that it was an enduring, smart and hard-working employer they would get.

From the definitions previously made in this paper, I would argue that there was an “ethos” related to the Y-program, ideas relating to a moral essence, some core values of the program, that were shared and communicated *within* as well as *outside* the program. The ethos can be described as an idea of a context that will foster tough, loyal, hard-working persons who do not give up too easily. This was announced in the marketing of “The toughest” program, and by referring to alumni students who had become CEOs in prestigious, international

companies. The ethos was communicated to new students in the narratives of tough examinations where few students pass. This was also what interviewed Y-students mentioned as “key skills”, appreciated by their employers. The students commented that the reputation of the Y-program as to be tough and demanding, was a core value of the program, something that made the Y-program stand out from other programs and that being a Y-program graduate was a quality indicator in itself, ensuring an employer that it was an enduring, smart and hard-working employer they would get.

If this “ethos” is shared and communicated I would argue that the question if it will be a springboard, or a barrier, to change of curriculum and pedagogy, or what direction a change may take, will depend on the *culture* of the program. The culture of a program is defined as an all-pervasive system of beliefs and behaviours *enacted in a specific educational context*. The culture is created in social interaction, and in our study we can see that there were changes in the culture of the program between 1998-2007.

The study context for the 1998 and 1999 students was a traditional study program and the students wanted to “test” their capacity to live up to the standards of that program. They described their first impressions of the academic study context as “chocking”, “chaotic” and “overwhelming” and trying to manage a high tempo and tough classes in mathematics evoke much agony and self doubt. A perceived harsh attitude among faculty contributed to their feelings of panic. Some students were upset by the lecturers attitudes towards them as students, exemplified by comments that *some* lecturers seemed to be fed up with students and seemed to enjoy tormenting them. Another comment was that some lecturers did not bother to explain issues that they considered too simple and too evident. The experience of a conflict between tough working conditions and the status of the program created some stress and ambivalence among the students. “It is supposed to be a tough education, you are becoming a graduate engineer, and then it has to be demanding an tough”. These students came to the program with a wish to be part of, and manage, a tough program, and they were prepared to sacrifice and work hard to achieve their goal to graduate from the Y-program. They were frustrated and stressed by the demands and attitudes of faculty, and some dropped out (exit), some stayed, managed well and engaged in student union activities and some stayed but to a high price, personally and socially. For these students, a strategy to survive was to distance themselves from the campus culture and maintain a feeling of “authenticity” among family and friends, or to take a study leave and study at an other faculty, travel or work. The culture they created was an “achievement culture”, where compliance to authorities (faculty) and where social activities and “life-matters” were seen as interfering with the common goal to uphold the reputation of the Y-program. When these students heard about the planned changes in the curriculum, implying projects, group-work, learning of social skills and new forms of assessment, i.e. home assignments and group assignments, they were hesitant and sceptical. They argued that the quality of the program would be jeopardized and open up for “inferior” students. This was in line with their image of themselves, as Y-student, in comparison to other students. They characterised themselves as more ambitious, more self-demanding, smarter and more hard working than other students, at the price of being labelled as bores and nerds, lacking social skills.

The context for the 2000 and 2002 had changed. These students also shared the ethos, but expected “the program” to maintain that and faculty to facilitate the students’ efforts to manage their studies. The curriculum had changed, but the students’ experiences were that new ingredients had been crammed into the traditional curriculum. Although they appreciated project work, group-work and new forms of assignments, they had a feeling that what really counted was the cramming of content and passing traditional assessment procedures. These students experienced a welcoming atmosphere, a helpful attitude from staff. The students were not prepared to make great personal or social sacrifices as quality of life was as important to them as passing exams. They searched for support among peer- groups and younger faculty. They were encouraged by project work and group discussions, but were anxious that the quality and reputation of the program, and thus their grade, would be

jeopardized. Their image as Y-students was much the same as before, but they adopted a more distanced approach towards it.

The ethos of the Y-program was identified as some core, moral values, characterizing not only the study program but also the students graduating from that program. The culture was changed, and this change was associated with a curricular change, from a traditional curriculum to a CDIO curriculum. The students attitudes and approaches to studying had changed, between 1998-2002, but so had the attitudes and approaches to teaching adopted by faculty. Despite that it can be argued that the changes made possible were those who did not challenge the ethos of the Y-program as a study context fostering and producing tough, loyal, hard-working persons who do not give up too easily.

Conclusions

From previous research and from the results of our longitudinal study, I have come to the conclusion that a strong culture, based on a strong ethos *can* be a barrier for double-loop learning requiring change of values and norms. Attempts to change values and norms can be conceived of as attacks on the heart and soul of the “ethos” and even as a war where groups are turned against each other. A strong culture, a strong ethos, can promote the achievement, self-confidence and self-esteem for some persons, but also contribute to feelings of failure and lost self-confidence and self-esteem and even stress and ill-health for other persons. For future recruitment, enrolment and graduation of students in engineering this should create questions like “What kind of students do we want to recruit”? and “What kind of engineers do we want to educate”? “How is the ethos of the program enacted in the content and form of the program and in the out-of class activities, in the interactions between students and between staff and students”?

As previous studies indicate, if the experiences of students and staff are *dissonant* with the expectations they have, they will exit, voice or stay and comply, maybe at a very high personal price and a high institutional price.

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