

TEN+ YEARS OF SUCCESSFUL WORKPLACE LEARNING THROUGH HOST COMPANY COLLABORATION

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Abstract

For a period of more than ten years a very successful Host Company Program has been running at the School of Engineering at Jönköping University (JTH), Sweden. This program enables close collaboration between the university and its staff and the 500 regional host companies (HCs) who support the quality assurance of the engineering education given at the School of Engineering.

With the introduction of the principles of CDIO at JTH, the host company program and the engineering methodology course was seen as a pre-existing building block of CDIO. This paper will explain in more detail how the HCP is orchestrated at JTH as well as how it is perceived by university staff, the engineering students, and the HCs. Also, how the HCP fits the principles of CDIO will be discussed further together with what is needed to be refined within the HCP.

Keywords: Host company program, Industry collaboration, Engineering Curriculum.

Introduction

The Host Company Program (HCP) has many purposes and benefits. One HC role is as a member of a 'trade council' supporting the continuous work within the 'board of education' in guiding the engineering education given at the School of Engineering towards supporting the creation of "work-suited" engineers. This involvement is today ranged through both bachelor and master programs. The success of this collaboration is supported by a study conducted by the 'Confederation of Swedish Enterprise' showing that the former students of JTH were rated as number one in being successful in finding job employment quickly after completed studies. Other valuable collaboration activities are company placed projects, both as projects running during the in-between semester leave as well as projects offered as after-diploma projects, allowing students to get a first chance at work experience while applying for job employment. Yet another specific HC activity is the involvement in the course 'Engineering Methodology' given during the first and second years of all bachelor programs at JTH. During this course student groups get a HC and HC 'mentor' within their engineering discipline appointed to them. They then follow this company during the course, making regular visits, and learn about the company, the role of an engineer through the eyes of their mentor, and also perform smaller tasks which then are reported at university seminars. This course is for many of the students the first

contact with industry and serves an important role as the students get a more balanced view of being an engineer than they would get from only academic studies.

History of the Host Company Program

The Host Company Program (HCP) started in 1994 as an activity within the civil engineering bachelor program. At the start, around 50 companies were involved. The initiative came from the program teachers and coordinator but was at the beginning not introduced as an obligatory part of the curriculum. Nonetheless, student participation was very high (close to one hundred percent). Because of this success among students and involved companies within the civil engineering sector the HCP quickly spread among the other bachelor programs. First in line to follow were the two bachelor programs mechanical and electrical engineering.

As early as 1996 the HCP served a key role in providing the “red thread” through the engineering education at JTH. The HCP has since then evolved to include all engineering programs at JTH and around 500 HCs (and organizations). Within the region, small and medium size enterprises (SMEs) constitute the greater part and the HCs within the HCP therefore naturally reflect this. This is also something that supports the JTH educational focus towards SMEs.

All engineering students now participate in the HCP which plays a major role in preparing them for professional occupations within SMEs. This thanks to the HCP’s focus on the engineering and entrepreneurial aspects which characterize SMEs as well as on leadership, communication, business mindedness and environmental awareness (Figure 1).

An SME-engineer needs to be able to act in a broad range of activities and not be too specialized. SME business resembles that of bigger companies with decentralized and flat organizations or that of typical consultant agencies. The students get first hand experiences of this through personal contact with HCs. This helps in seeing the link between theory and practice. The students also get a unique opportunity to familiarize themselves with the setting of their future workplace environment.

One central role for the HCs is within the course “Engineering methodology” (7.5 ECTS) where all students get a HC assigned to them. Other roles are as providers of diploma work assignments or as participants in company placed projects. These roles and activities are presented in more detail in Chapter 3.

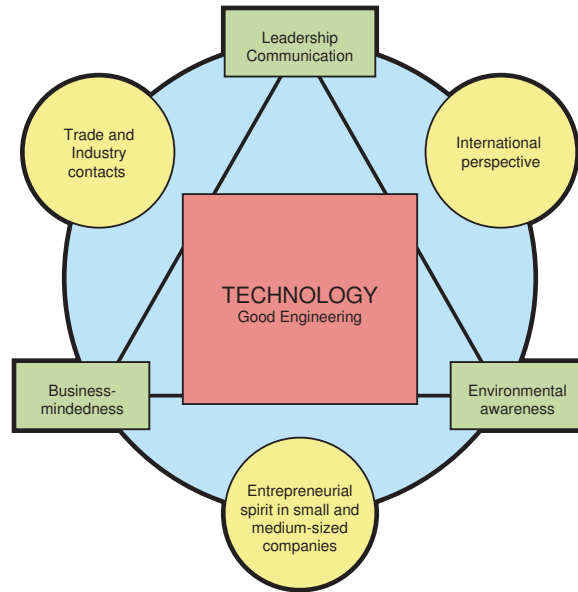


Figure 1. JTH's educational principle.

An additional and important part of JTH's educational principle (figure 1) is the possibility to study abroad at one of JTH's many partner universities. This opportunity together with the education's strong connection between academia and industry prepares students for a professional, creative, and entrepreneurial future. This is shown by the fact that many students start their own businesses while studying at the university.

Dissemination of HCP among Swedish Universities

JTH has been somewhat of a pioneer in collaboration between education and industry. In the beginning of the 1990s, JTH established a "trade council" to support the engineering education and its development. This trade council consists of industry representatives, teachers, as well as students. JTH was the first university in Sweden to implement a host company program and several others have followed. Many have copied the JTH concept as it has been presented in a large number of conferences, seminars, and workshops, as well as through direct collaboration between JTH and other universities.

Royal Swedish Academy of Engineering Sciences (IVA) has honored JTH for its HCP concept which led to several conference presentations with many university participants.

JTH has also been granted financial support from KK/NUTEK for the development of industry collaboration in general and the HCP in particular. One of the KK/NUTEK supported activities was the development of a method focused book on host company collaboration.

An additional KK/NUTEK supported activity has been the dissemination and implementation support of HC collaboration programs among other Swedish universities. In a series of seminars on this topic, 14 universities participated. A national open conference to which universities, companies, trade organizations, and students were invited has also been held.

In addition, the Swedish National Agency for Higher Education illustrates a good example of collaboration between education and industry by pointing out JTH's host company program.

Appreciations of the Host Company Program

A report from the Swedish National Agency for Higher Education show how Swedish students get accepted and established within the labor-market within one and one and a half years after completed education. The report shows that students from JTH are among the ones who get employment within their branch of education the quickest and that the focus on education and industry collaboration facilitates and stimulate the students' effort to shift from studies to industry labor.

Visits at the JTH have been made by several Swedish universities showing interest in the HCP concept. Representatives from, among others, Linköpings university, Chalmers university of technology, Umeå University, KTH (Royal institute of technology), Blekinge university, Södertörns university, Mid Sweden university, Borås university, the municipality of Karlskoga, Örebro university, and Karlstad university have all shown interest in appreciation of the host company collaboration at JTH.

The Host Companies' View on the Program

Every year JTH holds the "host company day" where all companies participating in the host company program are invited to JTH to meet students and teachers. One main activity during this day is a company fair held at the university. In 2007 more than 50 companies were represented by well over 100 representatives. During this fair company representatives get a chance to meet with first, second and third year students. The first year students take this opportunity to familiarize themselves with some of the companies they might get assigned to in the engineering methodology course (running during their first and second years). The third year students as well as the company representatives get a unique opportunity to discuss both diploma work assignments and future employment.

All in all JTH has more than 500 HCs involved in the HCP in some way, although not all of them are active at once. However, JTH's ambition is to expand the collaboration further by engaging a growing number of the involved companies to be active within the HCP activities each year.

Several company representatives have responded positive to the host company program. Following are some of their statements:

"We have always seen this as a very good way of recruiting future co-workers as we get to know students at an early stage." – Henrik Larsson-Hellström, Husqvarna AB in: Jönköpingsposten, November 24, 2006.

"This way we get to recruit new people at the same time as we get a chance to increase our competence level." – Mikael Johansson, PaperPak AB in: JönköpingNU, November 29, 2006.

"You cannot be a business manager if you don't know what the business is all about." – Per Segelryd, Transab AB in: DN.Jobb, January 21, 2007.

“We host a group of students from JTH every year. It feels very meaningful to us as many of the students are very curious and interested. Some return during their last year to perform their diploma thesis and it is also very common that students work here at the manufacturing plant during their summer holidays.” – Lisbeth Falkstedt, Fläkt Woods AB in: Dagens Industri, November, 2007.

The Students’ View on the Program

The HC collaboration is widely appreciated among the students and is something they would like more of during their education. The goal for JTH is to incorporate as many HC related activities as possible during the education.

One problem is that the HCP includes all students at all programs and that they, depending on their backgrounds and interests, have different expectations and/or experiences of the HC collaboration. Thus it is difficult to satisfy everyone’s wishes although JTH continuously strives to develop and perfect the program.

Evaluation of the Confederation of Swedish Enterprise

In the Confederation of Swedish Enterprise’s study of collaboration for the year 2007, JTH was ranked as number one with 84 percent of the students finding relevant employment within one year of finishing their education. This achievement is according to the evaluators due to the extensive collaboration with industry which has led to the students’ high appreciation of their education.

The Host Company Program

The close collaboration and integration with industry, together with industry and work-place practice, are two of JTH’s corner stone philosophies. This of course influences the education curriculum supported by the host company program but also JTH’s strive to conduct research in close collaboration with industry in general and SMEs in particular. This will in turn strengthen the education and better prepare the students to adapt to an ever changing industry practice.

The JTH research profiles are focused, applied, and of national importance and recognition. The ambition is that the HCs through closer collaboration with researchers at JTH will become powerful channels of knowledge dissemination within the region. This is also why JTH wishes to intensify its collaboration with industry even further.

In the Figure 2 some of the activities within the host company program are shown. Several of these are under development or not fully implemented and utilized.

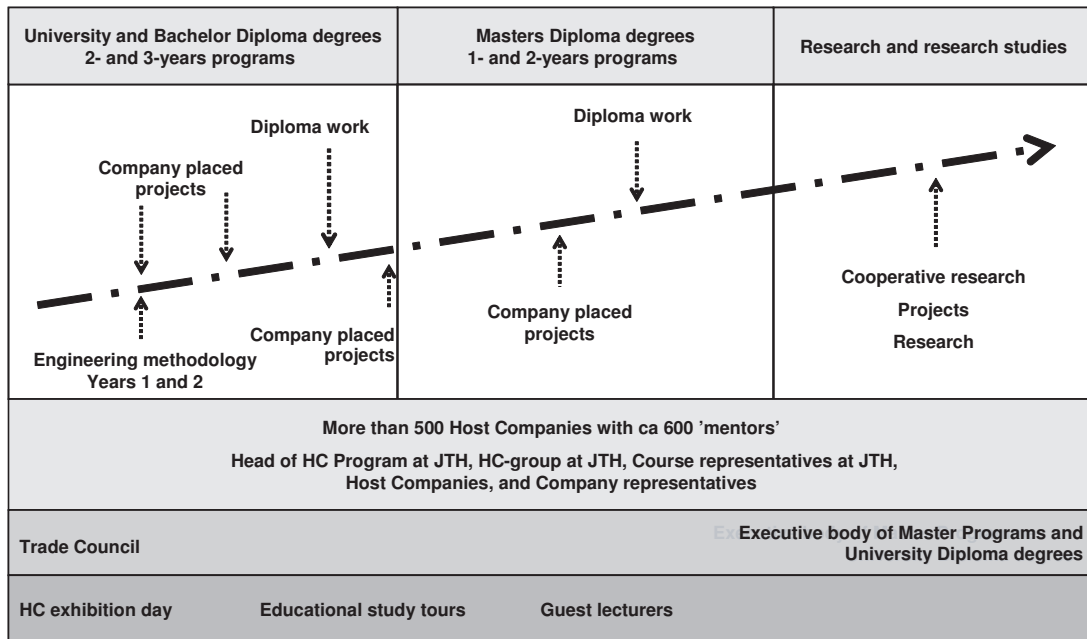


Figure 2. HCP activities and functions at JTH.

The now running activities within the HCP (as illustrated in figure 2) are:

- Engineering Methodology, years 1 and 2 for all bachelor programs
- Guest lecturers
- Company collaborative projects (within program courses)
- Diploma work, third year for all bachelor programs
- Educational study tours and industry visits
- Company placed projects (provided as an extra-curriculum activity for all students)
- Trade Council
- HC exhibition day (annually)

A web service which provides the companies with the opportunity to advertise project or employment opportunities directly to the students, and where students can learn more about a specific company, is also running.

University-Company Collaborations

Following are short summaries of some of the HCP activities.

The Engineering Methodology Course

One central role for the HCs is within the course “Engineering methodology” (7.5 ECTS) where all students get a HC assigned to them. All students take this course during their first and second years. During this course the students make six visits at “their” HC conducting interviews and studies. They then report their findings as written reports as well as in classroom seminars. This way all students get first hand contact with one company as well as second hand information about several others, preparing them for a life after university studies. This close student-company collaboration provides both students and companies with an opportunity to establish personal contacts for future contact (in courses, projects, or employment).

Lectures and Company Collaborative Projects

JTH motivates representatives from industry, and its HCs in particular, to visit the university and its students as well as appearing as guest lecturers in university courses within all programs. Both general company presentations as well as domain specific lectures are welcome as it gives the students an in-depth view of industry practice. Also, the HCs are welcome to participate in regular program courses by providing real-life examples (or project tasks) for the students to work on, either as short assignments or as full course-length projects.

Visits

Continuous contact between university staff and company representatives are upheld in part by the contacts within the Engineering Methodology course where university supervisors, throughout all programs, are given time to set up the collaboration. A total of 220 hours have been assigned for this activity. All companies are contacted by phone and in some cases even personal visits are made.

Throughout all programs at JTH educational study tours and industry visits are made, often in collaboration with a HC. This provides students with first person experience of industry practice and a chance to relate theory to practice. Together with other HCP activities it also provides the students with an opportunity to establish personal contacts with representatives from industry. Also JTH staff (both administrative personnel as well as teachers) is given the opportunity to visit industry through educational study tours. This strengthens the personal contacts between university and industry individuals.

Company Placed Projects

JTH provides the opportunity for all students to take the course “Company placed project” (10.5 ECTS). This is placed during the summer, between the second and third years, as six weeks work practice. The students then write a report about their industry practice, and also make a presentation about their experiences.

A second course is also provided to students after their graduation, “Company placed project” (30 ECTS). The purpose of this course is to provide in-depth knowledge about and experience of industry activities and engineering professions. The course requires a total of 18 weeks work practice. The students report their experiences both orally and in writing.

In the university’s two-year programs, which are given in cooperation with several trade associations, company placed projects play a key role throughout the program. These projects are more extensive and span over 20 weeks divided over the two years of study.

JTH continuously develops and intensifies the opportunities to incorporate company placed projects within all its programs.

HCP Organization

The HCP organization is not a separate organization devoted only to university and industry collaborations. All actors within JTH’s host company program are personnel from within the educational organization as illustrated below (Figure 3). The exception is the position “Head of HCP” which is held by one person, full-time devoted to university and industry collaboration.

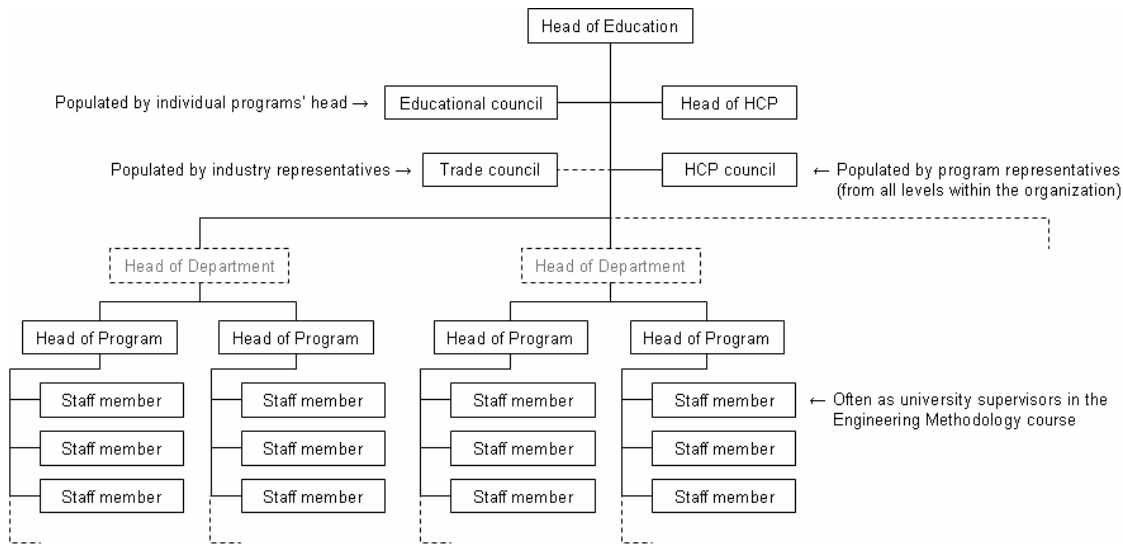


Figure 3. The HCP organization within the education organization at JTH.

This organization, which allows the extensive activity that is the HCP to be orchestrated, is also the reason for the HCP's main problem issue. Since all personnel involved in the HCP have other responsibilities, some perceive this as a too time consuming extra activity they rather could do without. This issue is mostly a result of policy on resources and funding, and something JTH continuously tries to refine.

CDIO at JTH

JTH has a "curriculum concept" which focuses on preparing students for trade achievement and way of working at small and medium-sized enterprises. Courses are built on a broad technological knowledge base, provide engineering skills and stimulate towards an entrepreneurial spirit. The programs also provide knowledge from topic areas other than technology such as leadership, communication, business and ecology. Internationalization and collaboration with industry are also driving principles. The HCP gives students, during their first two years of study, the opportunity to put their newly acquired knowledge into practice. It is no doubt that CDIO is right in line with this concept, and will help JTH to develop the concept to be even better.

CDIO is under implementation at all of the bachelor and master programs at JTH. That is, 6 bachelor programs (3 year) in the areas of Mechanical Eng, Civil Eng, Chemical Eng, Computer Eng, Electrical Eng and Industrial Engineering and Management, and 5 master programs (1 or 2 year) in the areas of Mechanical Eng, Electrical Eng, Civil Eng and Industrial Organization and Management.

To manage the implementation, a CDIO-team has been formed which will interact with the existing programs, and the learning and teaching committees. The implementation of CDIO started during the autumn of 2007 and it will probably take several years until CDIO is fully implemented at all programs.

The CDIO-initiative emphasizes generic skills of team work, communications skills and professional ethics as well as design skills and industry relevance, along with more traditional

technical skills. Although the engineering programs at JTH already comprise a lot of these skills, it is a fact that joining CDIO will further strengthen these important issues. CDIO is going to be used as a framework for the implementation of these skills in all of the programs, but it is important that a high level of technical competence will still be maintained.

Goals to Achieve

The following goals for the CDIO-work at JTH have been set up:

Achieve a sound revision of our curricula and way of teaching.

- Make the courses more appealing to prospective students.
- Strengthen the “curriculum concept” and whereby better prepare the students for their roles in industry, especially in SMEs.
- Develop a system that evaluates programs against the twelve CDIO-standards, and provides feedback to students and faculty for the purposes of continuous improvement
- Document the experiences regarding the curriculum concept, especially the HCP, to share with other collaborators.
- Actively participate in CDIO activities as not only a participant but a contributor to the goals and programs of CDIO.

The Future of the HCP

The development of the HCP is an ongoing activity. In the coming years research collaboration with industry will be further integrated with the HCP, more extensive company placed projects will be integrated in the engineering curriculum, and regional nodes (already in the making) will be set up to further simplify knowledge and need dissemination as well as meeting opportunities between industry and academia.

Open Questions

The following questions are still to be answered, and we hope that they will be addressed in collaboration between JTH and the CDIO community.

How clear connection between the HCP and CDIO is there?

- How can we strengthen the teacher/staff enthusiasm and commitment?
- How can resources for the HCP be secured?
- How to handle the opinion that the HCP activities take time away from pure “academic studying”? Should we focus on practice or theory?

References

Confederation of Swedish Enterprise's study of collaboration for the year 2007:
<http://www.hj.se/cmscripts/php/press.php?page=show&id=223>

HCP and the Press

List of links to Swedish articles on JTH and the host company program.

JTH and company collaboration:

<http://www.svensktnaringsliv.se/skola/hogskolan/article20078.ece>

Collaboration with Husqvarna AB:

<http://www.svensktnaringsliv.se/skola/hogskolan/article20089.ece>

Jönköping University – a good example of industry collaboration:

<http://www.svensktnaringsliv.se/material/rapporter/article245.ece>

Jönköping University – a good example of industry collaboration:

<http://www.svensktnaringsliv.se/material/debattartikel/article3241.ece>

University studies in Jönköping leads to quick employment:

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Host companies employ students:

http://www.teknikforetagen.se/upload/sve/Teknikforetagen_Direkt_nr2_06.pdf

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