

# Social and Soft Skills Training Concept in Engineering Education

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**Abstract -** Scientific investigations have shown that career development and success in life are very much based on the outward appearance and the behavior of a person and only to a minor extend on the mere technical expertise.

In today's industry and trade, there is an increasing demand for engineers who don't just have excellent competence in their field of specialization but also a good understanding and practical experience in the so-called social and soft skills. These subjects are usually not adequately addressed in engineering degree programs. However, the well known "Association of German Engineers (VDI)" suggests that up to 20% of the engineering curriculum should be in the non-technical field such as language training, self-management, personality development, communication skills, project management, economics and other related topics.

The Management Center Innsbruck (MCI) has therefore developed a multi level training program in the social and soft skills area including project management and leadership development. This program is an integral part of the engineering degree program curriculum at the MCI

*Index Terms* - Social and soft skills training, project management and leadership training

## DESCRIPTION OF THE PAPER STRUCTURE

The paper starts with an introduction showing the need for social and soft skills training in engineering education. In the second section, some background and a brief description of the institution will be given. The main part of this paper describes the training program development and a set of eight courses in the Social and Soft Skills area as well as project management and leadership.

## INTRODUCTION: THE NEED OF SOCIAL AND SOFT SKILL TRAINING IN ENGINEERING EDUCATION

A graduate of an engineering degree program is usually confronted in his first job with challenges that very often exceed his technical knowledge by far. Typical examples are:

- In almost every aspect of an engineering job good presentation and communication skills are required for a successful career. This includes also the competence to practically apply state-of-the-art presentation software und to present technical aspects in a convincing way to colleagues, to leaders but even more to customers.
- There is also an increasing tendency in engineering to work in teams. Every team-worker has to find his way how he can make a significant contribution to the overall team performance. Therefore he has to know his specific strengths and skills. A high capacity for team work very often has a major impact on high performance output.
- Not only in Marketing and Sales, the young engineer needs negotiation skills including conflict management.
- Engineering projects can only be managed successfully if there is a practical understanding of process and project management.
- This is in line with the necessity for basic leadership skills. Young engineers who start in a company are very soon confronted with the challenge to lead other people e.g. in work groups or project groups. In production-related companies this might include the leading of shift workers or shift supervisors.

These are only some reasons why a specific training concept should be implemented in today's engineering degree programs. The image of the engineer in the German-speaking world is still that of a "specialist" sitting all day in front of his computer without interacting with people. This image has only very little to do with the actual job characteristics.

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## **THE MCI TRAINING APPROACH IN THE SOFT AND SOCIAL SKILLS FIELD**

### **BACKGROUND AND SPECIFIC ASPECTS OF THE INSTITUTION**

The introduction of Universities of Applied Sciences (UAS) in Austria in 1994 has brought quite a breath of fresh air into the structures of higher education systems in German speaking countries. A UAS degree program is "equivalent to but different from" a traditional university degree program and is characterized in particular by its close relations with trade and industry, its practical orientation and customer focus, a strictly organized program schedule, and a highly service-oriented approach.

Being organized on a private law basis UAS degree programs of MCI are officially accredited under public law. Due to a quality assurance system that sets international standards and an extensive network of renowned partner universities all over the world, MCI guarantees not only excellent conditions for students but also a high acceptance of its degrees both in Austria and abroad.

The assets offered by a degree program at MCI include:

- practice-oriented training and education on university level
- a science-based approach
- top-notch lecturers from trade and industry, science and the consulting industry
- a strictly organized schedule with a limited program duration
- optimal tutoring in reasonably-sized groups
- interdisciplinary technical, methodical and social competence
- optional semester abroad at one of MCI's many partner universities (full-time programs)
- ongoing adaptation of contents in line with international developments
- close relations with trade and industry through lecturers, joint projects and internships
- officially acknowledged degree in conformity with EU standards
- excellent career prospects both in Austria and abroad
- eligibility to take up doctoral degree programs at Austrian universities
- advice, service and network of the graduates' club "MCI Alumni & Friends"

### **PROGRAM DEVELOPMENT**

The high-level training program has been developed over a period of over one year by an expert team including full-time professors and external lecturers with broad practical experience obtained during their professional career. In addition the team members come from different backgrounds such as engineering, natural science, business administration, law and also professional training. The head of the development team, who is also the author of this paper, is,

however, an engineer with special training in human resources management

Another input has been obtained by carefully evaluating the outcome of the already established training courses using the course evaluation forms. Current attendees are full-time students but also students that are already working in the technical field studying on a part time basis.

In addition it has also been investigated which training programs are currently offered in industry and trade by relevant companies for post graduation training and early graduates.

Goals of the (development) project were

- to consolidate the different (current) soft and social skill training measures for engineering students at the MCI and to develop a high level training program
- to develop a practice-oriented text book in the various aspects of soft and social skills including project management and leadership
- to develop and continuously improve the training material by taking into account market trends and also the results of the student evaluation forms

The training program developed consists of the following four levels, each including at least two specific training courses:

#### **Level 1: Basic work skills**

- Self Management
- Presentation skills

#### **Level 2: Personality Competence**

- Personality Development
- Team training

#### **Level 3: Communication Competence**

- Communication and sales skills
- Conflict management

#### **Level 4: Leadership Competence**

- Project Management
- Leadership Training

Each training block is designed as a two-day, small group seminar. Attendance is mandatory. In addition each bachelor student is assigned to write a report or give a presentation based on specific and partly individual issues. It is suggested that this training program should be concluded within the 6-7 semesters of the bachelor training program. It is designed for an equivalent of approx. 8 European credit points ECTS, and therefore equivalent to a work load of 200 hours within the bachelor program, which is equivalent to approx 5% of the total time investment for the bachelor program.

Human resources managers from relevant companies appreciate the concept and confirm the necessity of such a program in engineering education.

## THE COURSES

### COURSE 1: SELF-MANAGEMENT

A look at the typical day of a student or an academic reveals that a lot of time and energy is invested for things that have only a minor impact to the goals of the company or the individual. It is estimated that unspecific work might consume 60%-70% of the performance potential. The emphasis of this course is to increase the daily performance by concentrating on various aspects of self management.

Major aspects of this course are therefore:

- Mindset:  
Attitudes, proactive versus reactive thinking, preoccupations, Neuro Linguistic Programming
- Goal Setting:  
Necessity of goal setting, possible definitions and criteria
- Priority management:  
Based on personal or company values, typical tools such as "Eisenhower Principle" or "Pareto principle"
- Working plan:  
"To-do" list versus "not to-do list", practical principles for effective work planning
- Time Management  
Aspects of time, time management using Microsoft-Outlook, key focus areas, time wasters, personal/bio-rhythms, tips on how to save time
- Organization  
Workplace, electronic tools to improve work and self organization

All these aspects were discussed and elaborated on using hands-on workshops and other appropriate methods.

### COURSE 2: PRESENTATION SKILLS

The well known communication expert Paul Watzlawick once made the statement „It is not possible, not to communicate“.

The 21<sup>st</sup> century is characterized by a very high pace in communication and almost unlimited possibilities in conveying information. It is therefore important to assure not only the acceptance but even more so the interpretation of communicative signals at the receiver side of the message.

This course starts with a general overview of the subject "rhetoric", its historic development and meaning especially in a digital world. A second step deals with a brief description of the building blocks of a public speech as well as the right sequencing. This information is completed by explanations on rhetorical instruments and rhetorical figures. Another important part is the topic: Preparation for public speech, completed by tips and indications on how to obtain a higher performance in public speaking.

The aspects of presentation deal also with aspects on how results and success should be presented in a convincing way.

This seminar should make a significant contribution to improving the competence in communication and public speaking. This is achieved by practical input and video training and evaluation by the presenter, the trainer and group feedback.

In many aspects of daily work and life these components will generate good results. Last but not least, success in sales is very often dependent on the art of correct presentation.

### COURSE 3: PERSONALITY TRAINING

A quote of the legendary management expert Peter F. Drucker [1] in one of his books describes the necessity of personality training, life planning including career development as follows: "We will have to learn where we belong, what our strengths are, what we have to learn so that we get the full benefit from it, where our defects are, what we are not good at, where we not belong, what our values are. For the first time in human history, we will have to learn to take responsibility for managing ourselves. And as I said, this is probably a much bigger change than any technology, a change in the human condition. Nobody teaches it no school, no college and probably will be another hundred years before they teach it".

Major aspects of the course are:

- Reasons for career and life planning.  
Different phases in life, taking responsibility, different role models
- Discovery of intrinsic potential:  
The Johari window, family impacts, value profiles, motivational factors, personality profiles according to the DISC scheme
- Realization of one's potential  
Dreams, visions, mission statements, effective planning, goal setting and controlling, mentoring and coaching

The emphasis of this course is on providing the attendee with different inputs in order to help him in the process of finding out his own personal values, potential and destiny.

### COURSE 4: TEAM TRAINING

Many tasks and problems are handled in work groups and therefore in teams. In order to effectively lead teams, a general understanding of the functioning of teams and the behaviour of people has to be obtained.

Group exercises including outdoor training, role plays and case studies are the means to experience the following issues:

- Self-perception and image of group members
- Different team roles
- Self-perception and image of the group
- Communication, trust and working together as a team
- Team conflicts

Specific tools have to be learnt to solve problems within teams. In addition, facilitation of meetings and related communication processes are important aspects in leadership.

This course provides therefore:

- Tools for problem solving
- Methods to improve creativity
- Decision making
- Management of successful meetings

#### **COURSE 5: COMMUNICATION AND NEGOTIATION TRAINING**

Every individual is confronted daily with numerous communicative situations with colleagues, employees, managers but also friends and family members.

The success of a person is therefore strongly linked to his communication skills. Important aspects for successful communications are:

- Active listening
- „I versus You“ message
- The technique of asking questions
- Verbal expressions

The building blocks for effective communication will be deepened. Different strategies are presented on how to convince other people (e.g. “five-sentence strategy”).

Equipped with these basic principles the course can be used to

- master personal attacks
- lead difficult talks
- achieve better results in negotiations
- better understand the basic elements in sales

#### **COURSE 6: CONFLICT MANAGEMENT**

Conflict and conflict management are an integral part of people living together. Different viewpoints and poor communication are very often the reason for conflicts, which quite often become a law suite.

This course highlights the conflict, starting from its early beginning up until the point of conflict escalation. It describes the different types of conflict and gives practical guidelines to “diagnose” a conflict situation. If conflicts are seen as chances and are dealt with in a constructive way, they offer a potential for change. Effective methods for conflict resolution are for example conflict mediation or conflict moderation. These methods are explained in detail during the course. Another aspect describes communication methods for conflict de-escalation

In order to realize personal strengths and weaknesses in difficult situations, typical basic pattern of conflict resolutions are described. The personal conflict pattern will be reflected using the Enneagramm.

#### **COURSE 7: PROJECT MANAGEMENT**

The program describes how to deal with projects in a technical environment and introduces a process model and additional useful tools in order to realize projects. A glossary

of important project management terms and selected IT-tools are explained in detail.

There are three levels in project management.

- The first level shows preparation, implementation and support of the project.
- The second level refers to the implementation of single projects into the overall context of a business.
- The third level deals with consequences of projects in the society.

The explanations of the basics mainly refer to the first level of project management. Consequently, the activities from the idea to the preparation phase are presented. Furthermore, the project start and the implied activities, like planning, organization, as well as the measures related to the project end are explained in detail.

This course supports people with a technical or natural science background in developing and realizing projects. Additionally, the associated hand-book offers many practically orientated examples, support tools and important web-links.

#### **COURSE 8: LEADERSHIP TRAINING**

Leadership is the proactive design of people working together in a company with the goal to best fulfil tasks and to achieve goals. This means that leadership has an influence on people and organisations.

Especially for technicians and engineers it is decisive to understand the interaction with the “leadership-work” and to build up know-how and tools for the work in organisations and projects.

The following aspects are highlighted and discussed explicitly:

- Importance of leadership and people management for companies and teams
- Behavior of people in organizations and how this can be anticipated and assessed in advance
- Design of complex leadership situations
- Instruments for motivation to improve the performance.

Starting with the historical development of leadership, specific questions will be elaborated on that are important in production-related jobs, technical sales and project management

Specific case studies from the daily business of small and bigger companies are included in the training sessions in order to equip the young engineer for his future leadership roles.

Even if students generally do not assume active leadership positions, it is vitally important to enlarge the perspective for the importance of leadership in order to motivate them for the issue of leadership.

## **OUTCOME/ CONCLUSIONS**

The staged and concise training program described here is still in the implementation phase and is constantly under optimization. Yet many aspects could be achieved so far:

- A team of full-time professors and external lecturers from different backgrounds (engineering, business, law, and other professional trainers) has been formed to develop and further improve the training concept based on industry requirement.
- The training concept will be published in book form. In addition a concise folder with training material such as powerpoint slides, case studies, workshops is under final development.
- The discussions with engineering students and also their course evaluations give a clear indication that the acceptance for these trainings is generally high.
- Managers and leaders of relevant companies appreciate the training concept and recognize the holistic approach of the engineering program at the MCI. They value the contribution of this concept as an important part of engineering education.

## **REFERENCES**

- [1] Drucker, P., F., "Management Challenges for the 21<sup>st</sup> century", HarperCollins Publishers, Inc, 1999, p.167