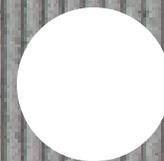


*POLE Project*  
*16th Edition-Fall 2016*

## **I see *Concrete***

Tecnológico de Monterrey  
Campus Guadalajara; México

Industry partner CEMEX R&D



see something trough here?

**POLE**  
**2016**

## **POLE - A Platform for Learning and Teaching**

University students are nowadays increasingly challenged within their specific core disciplines; in addition however, they are also supposed to develop skills in order to apply this particular knowledge in practice. This ideally goes hand in hand with a sense of maturity of the individuals' characters vis-à-vis the social, cultural, and economical environment. The practical application of theoretical knowledge can thus only be implemented successfully if these three basic elements are taken into account.

In addition to university students' disciplinary knowledge, the ability to work efficiently within multicultural environments has become increasingly important. Universities are therefore looking to expand and deepen this particular aspect in order to provide the necessary expertise in this field. This realization has led to universities becoming more proactive with regards to networking and offering joint courses, which is where POLE (Project Oriented Learning Environment) is actively involved in. In the course of this new collaboration, it has become apparent that the complementary aspect has gained in importance. An example for this is the liaising between strongly research-oriented and more practically oriented universities with the common goal of being able to implement the according results as soon as possible. Apart from contributing to more comprehensive and efficient process work, the POLE courses lay particular emphasis on improved cultural know-how.

In order to do this students are encouraged to contribute their experiences within international teams, regardless of geographical and language barriers.

POLE sees itself as a learning system cooperating with international universities. It does so within a reflexive context, taking into account the various cultures involved in order to create new methods of resolution regarding teaching and learning methods. The students are at the core of this concept, and are given the option to develop process-oriented expert knowledge through trans-disciplinary teamwork. Simultaneously, they learn to work independently and to deal with current problem cases through the use of modern information and communication tools. Processes within POLE are largely organized within the individual team themselves. The according goals are set and committed to within the teams; in case of resulting conflicts, weight is given to iterative processes in order to find solutions. A further characteristic of POLE is an increasing tendency for the overlapping, or even amalgamation, of various lines of work in order to give way to new, holistic, and trans-disciplinary perspectives.

POLE is a comprehensive platform which gives students the opportunity to contribute their full potential. Each individual's attitudes, characteristics, and abilities are taken into account as a whole in order to allow as much space as possible for independent development of students' responsibilities and skills.

A contribution to the concept of 'Campus in Mind' is made by POLE in providing the multidisciplinary teams with learning facilities that are based on experimental and interactive technologies. The teamwork in the POLE courses allows the students to further expand their specific professional skills; on the other hand, it also gives them the opportunity to develop more generic competences, which nowadays is one of the key qualifications in order to be able to adapt to a continuously changing environment.

The course also enables students to evaluate their ability to function in a team and to analyze their styles of communication. Through practical examples, students are given the opportunity to explore how well they are able to work in a team, and to what degree they are flexible to accept members' concerns from other disciplines, i.e. how they can integrate these into their own work and patterns of thinking.

Experts and mentors which do not form part of the university, but are active members of businesses and the industry in general, are an essential part of POLE courses. Their participation contributes a high degree of practical knowledge to the projects, pointing out the actual 'state of the art'. In this manner, POLE manages to link academic education and professional practice. The intensive interaction between these two elements guarantees a rapid transfer of technology, while at the same time ensuring that the students involved are motivated to a high degree.

POLE is not only about to significantly remold the landscape of teaching and learning at universities, but it also intends to yield substantial influence concerning decision-making and the creation of practical work processes. In association with university teaching staff, the mentors are instrumental in contributing expert knowledge and regular feedbacks to the teams, while they are also actively involved concerning the evaluation of processes and related products. The latter will be of increasing importance in the future, as scientific research has been initiated in connection with reflections of certain POLE processes. It is the intention of this kind of research to support students with regards to the awareness of their personal learning styles. The findings will then be made accessible for future work in a broader context.

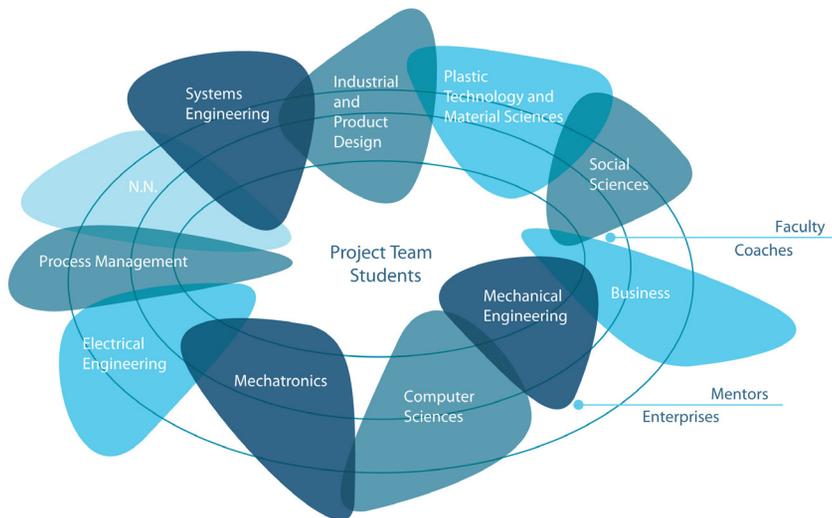
Further POLE research issues include for example the creation of knowledge databases, which will serve as a tool for more rapid evaluation of solutions and decision making processes in the future. These efforts are based on the knowledge that a large part of creational, construction, and design processes are substantially shaped by re-design.

The initial POLE courses had been launched as a result of the ever increasing demands in the current building trade, which is of a highly complex, segmented, and competitive nature. Experts from the fields of architecture, civil engineering, and construction management are clearly demanding a broader education, along with more diversified core skills for engineering students.

The POLE learning environment and its associated methodology is not limited to this initial context, but allows students from practically any discipline to apply their theoretical knowledge in practical cases. Through collaboration in interdisciplinary teams guided by process management students, students from fields such as architecture, urban planning, civil engineering, interior design, plastics engineering, mechanical engineering and economics were given the opportunity to cooperate in POLE projects and thus better understand the individual processes involved and acknowledge their relation to the social, economic, and political dimensions.

In 2016 POLE goes into its 16th year. It will bring together the disciplines of Design, Architecture, Medialogy, Artists, Computer Science, iCompetence, Mechanical and Civil Engineering, Applied Psychology, Entrepreneurship, Business, etc.

POLE invites students and faculty from the Tecnológico de Monterrey, Campus Guadalajara (leading house) and Queretaro (Mexico); University of Applied Sciences North Western Switzerland, Aalborg University, Campus Copenhagen (Denmark); Merz Akademie, Stuttgart; BTK, Berlin (both Germany); Windesheim University, Zwolle (The Netherlands), Illinois Institute of Technology, Chicago, USA, Technical University of Lodz (Poland), Zurich University of the Arts (Switzerland).



## Responsibilities of POLE and its Partner Universities

POLE considers itself as a learning platform which enables and facilitates trans-disciplinary processes. It has also proven to offer an excellent test bed for research in the field of modern teaching and learning as well as in the field of evaluation of novel learning spaces. At the same time it is important to put on record that the responsibility for the disciplinary supervision of the students remains with the sending home universities. This relates also to the grading of the students' contribution.

POLE on the other hand will provide a qualification on the team processes and on their interaction patterns. (It is suggested that students who successfully participate in POLE projects receive academic credits based on the ECTS.)

The experience during the previous POLE courses has revealed that this double responsibility of the student towards his/her POLE team and towards the home university and professors, respectively, may also bear conflicts. POLE demands that team decisions be respected what the approach and the agreed objectives is concerned; POLE leaders are convinced that within this frame work there is still ample tether to adhere to high academic standards in the disciplinary work.

Saying this makes it obvious that a close accompaniment and monitoring of the project by the faculty of the partner universities is essential and highly welcomed by POLE.

The involved faculty will receive full access to all documents of the POLE project. Their participation during the kick-off events, the reviews and the final presentations will add to the multidisciplinary depth and thus to the quality of the project and to further developments of POLE.

## Assessment

POLE has the ambition to continuously improve its learning and teaching platform. One step to do so is by integrating an external assessor into the process, who will participate in as many of the POLE design activities. POLE has cooperated in this field of evaluation and assessment with the Department of Education of the University of Applied Sciences North Western Switzerland and with Stanford University since the very beginning in the year 2000. The participatory assessment will focus on the effectiveness of the design processes and the adequate use of collaborative communication technologies.

## The Partner CEMEX

The POLE project 2016 is organized in co-operation with CEMEX, the second largest company in the world in the production of cement, concrete, aggregates and ready-mix products. CEMEX is active in more than 100 nations and the employer of over 50'000 people. CEMEX has its headquarters in Monterrey, Mexico, but operates worldwide in production, distribution and services. CEMEX runs a Research and Development Center in Brügg, Switzerland, where new types of concretes and innovative applications are being investigated and developed.

## Project Task

Already today, there is a big variety of different concretes available. But CEMEX must invest in innovation to stay a strong market leader in the field. New energy requirements, urban gardening concepts and ecological responsibilities challenge the traditional palette of CEMEX's products. On a promotional level *emotional factors* are crucial. It is important to allow potential customers to *experience* the qualities of this versatile material. Therefore, the visualization of concrete is high up on CEMEX's agenda to show investors and potential users that concrete has great advantages in relation to glass/steel or wood and offers additional options for construction.

The challenge will be to bring new concepts into life as prototypes in concrete (e.g. houses, pavilions, furniture, etc.) and/or in their visual models. It will mean to convincingly visualize the positive qualities of concrete to potential users in appropriate media, e.g. through virtual reality technologies (Google Glasses), movies, stories that create an understanding of the differences of materials.

In addition to the traditional types of concretes, the CEMEX Research Center has recently produced some innovative new concretes that are in the pipeline to considerably change the world of construction. It will be the task of the POLE project "I see concrete" to create and invent scenarios for such applications of these materials and to visualize this in an emotionally attractive fashion.

The task is not restricted to the description of possible uses and their presentation; in fact it is expected that models, prototypes and samples are generated to illustrate the qualities of the material(s) in attractive and convincing ways. This can be with regards to the visual appearance (texture, color, structure, etc.) but also with respect to the physical properties of concrete (stability, heat-transfer, acoustic properties, etc.). It will also mean to give convincing arguments for the use of concrete, a material that can not only offer feelings of security but also of coziness and well-being – and to create ideas to change the aversion towards this material in the heads of many people. These latter aspects are at the center of the POLE 2016 project task that might be summarized under the headline “Growing the CEMEX pie”.

The challenge will be to bring new concepts into life as prototypes in concrete (e.g. houses, pavilions, furniture, etc.) and/or in their visual models. It will mean to convincingly visualize the positive qualities of concrete to potential users in appropriate media, e.g. through virtual reality technologies (Google Glasses), movies, stories that create an understanding of the differences of materials. The teams will be composed of students from Industrial Design, Architecture, Medialogy, Artists, Computer Science, iCompetence, Mechanical and Civil Engineering, Applied Psychology, Entrepreneurship, Business, etc., all originating from the many partner universities of POLE around the world that bring their disciplinary views, their cultural backgrounds and their different methodological approaches to POLE. It is this interaction of different professions in trans-disciplinary teams from which CEMEX expects a breakthrough in innovation.

## Structure of the Course

### Virtual kick-off | August 24, 16:00 h CEST

Partner and Task

Start up Video Conference: The introduction of the different universities, partner and introduction to the task

Collecting and Recording

While getting to know the communication tools, the students receive an introduction into research, collecting data and distributing information. How to get a deeper impression/understanding of the topic. This important background will allow for a well-founded start into the project and to elaborate meaningful solutions.

### Physical Kick-off | August 29 to September 4, 2016 | Guadalajara

Team Formation

It proved extremely important to build a profound social link among the students as the basis for a solid collaboration during the course of the project. With physical presence in Mexico (Guadalajara) all students and faculty members come together mainly for the following purposes:

Lectures on Specific Topics

Several lectures are given to facilitate the start-up for the project with respect to a common nomenclature.

Critical aspects of the project are addressed by the lectures, given by faculty and also experts from the construction industry.

Project Planning

Definition of the project's process outline/plan: At the end of the kick-off week, the teams are to present a project plan including work packages, time line, definition of milestones, resource planning, schedule of further activities, etc. The presentation of the project plan to faculty, mentors, and experts from industry concludes the kick-off week, dismissing the students to their home universities with comments and recommendations for the further course of the project.

Research on-site

The students are given the unique opportunity to meet the client and collect information offered by the municipal government and the academic team.

### **Review 1 | October 12, 2016, 16:00 h – 20:00 h (CEST)**

(duration of presentations 15 minutes/team; discussion 15 minutes)

Trend Research and User Story

- Mega Trends, Technology Forecast
- Product Ideation (presentation of many possibilities)
- Product Selection and Rationale for Decisions
- Research on Selected Scenarios
- Reflection on Distributed Team Collaboration (including the role of each team member)
- Project Timeline and Milestone Check
- Questions to Coaches

Note: Final versions of all of the materials that will be used in the design review presentation (PowerPoint presentations, spreadsheets, sketches, etc.) must be uploaded to the team's intranet platform 1 day prior to the review to make sure that all sites have access to them.

### **Review 2 | November 9, 2016, 16:00 – 20:00 h (CEST)**

(duration of presentations 15 minutes/team; discussion 15 minutes)

Conceptual Work & Proof of Concept

- Description of Selected Product (out of a series of many)
- Proof of Concept
- Sketches and Mock-ups
- Story Board (concept for final movie)
- technical drawings
- Reflection on Distributed Team Collaboration (including the role of each team member)
- Project Timeline and Milestone Check (including identification of remaining tasks and deliverables for project completion, binding specification of team members' arrival in Switzerland for presentation of team's contribution)

### **Finals | December 14, 2016, all day**

Final Presentation of the Project | CEMEX Research Center, Brügg

All relevant final deliverables must be uploaded to POLE's Project intranet portal. (by December 12, midnight)

Visualisation, Demonstration of Exhibition Objects (Movies, Animations, Posters, Installations, Interaction Devices, etc.)

A. Oral Presentation of Project Outcomes (audience: colleagues, faculty and jury; duration: 20 minutes/team)

- Concept Demonstration; Discussion of why and to what extent the proposed design fulfils product requirements
- Discussion of Individual Learning Insights (as members of a multi-disciplinary team)

B. Oral Presentation of an Executive Summary for a Delegation of CEMEX's Directorate (duration: 4 minutes/team)

C. Physical Deliverables (due at final presentation)

- Physical Installation for Exhibition (Booth, Posters, Screens, Projectors, etc.)
- 5 Copies of a Comprehensive Final Project Report, which should include the following sections:

1. Executive Summary outlining the key points of the proposed design
2. Background Research section documenting any relevant background research that was conducted.
3. Requirements Section documenting the final list of design requirement the team had created.
4. Design Development Section documenting the different ideas that were generated and the decision making process that was used to select the final concept (with rationale).

5. Design Specification section documenting the specifications of the proposed design (detailed engineering drawings, including materials information should be placed here)

6. Design Process section documenting the overall design development and interdisciplinary processes that were used by the team (including reflection on the multi-cultural and interdisciplinary aspects of the project). • 5 DVDs containing the final report, the movie(s), etc. plus possible appendices



## Contact & Applications

**Students in the program of the following disciplines are welcome to apply:**

- Design
- Architecture
- Medialogy
- Arts
- Computer Science
- iCompetence
- Mechanical
- Civil Engineering
- Applied Psychology
- Entrepreneurship
- Business

## Application Documents

Students interested in participation submit:

- Curriculum Vitae
- Letter of Motivation
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Deadline: August 1st, 2016 to: [c.monterrubio@itesm.mx](mailto:c.monterrubio@itesm.mx)

Confirmation of participation from the POLE team until mid August 2016.

## Tecnológico de Monterrey, Campus Guadalajara

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POLE

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TDM-DADIC POLE Team

Heads: Prof. Claudio Monterrubio and Prof. Dr. Christoph Holliger

Associates: Dr. Antonio Pita and Dr. Roberto Iñiguez

Information & Web Technologies: Manuel Borrayo.

## **Information and Collaboration**

### **Technologies ICT**

POLE is offering a modern infrastructure with respect to information and communication technologies (ICT). POLE encourages the partner universities to support their students with respect to ICT as much as possible, in particular granting them access to their own information technologies. The following list of ICT tools characterizes the minimum and necessary standards:

- 24 hours per day access to work stations, so students can work on their tasks and are able to communicate at all times
- Access to telephones with international access for conference calls
- Video conferencing facilities (available at least 2 hours per week and team)
- Suitable IT support (firewalls, basic support)
- Broad band internet access
- MS-Office including PowerPoint, Acrobat Reader, ZIP and FTP programmes

During the kick-off sessions POLE will provide instruction in the use of data transfer tools for the sharing of the use of video conferencing as well as in disciplinary applications.

### **Evaluation Criteria**

The evaluation of the project results will be in the duty of an international jury. It will consist of one member of each discipline and two members of the POLE directorate as well as of members of CEMEX. Each team will receive a report with an acknowledgement of the contributions according to the following criteria: (1) fulfilment of the task (detailed specifications will be handed out during the kick-off week by CEMEX patrons), (2) usability, (3) innovative potential of solutions, (4) presentation of product, (5) general impressions.

## **Confidentiality Agreement**

Due to the potential of such novel products, CEMEX and POLE have agreed to respect a confidentiality agreement which in turn has to be signed by all partners involved in the project. Individual copies for each participant will be sent to the selected students in advance and shall be ready for signature at the kick-off event. They are a requirement for the participation in the project.

### **Budget for Production Costs**

Each team is granted a budget of max. CHF 500 for material and production expenses. Payments can only be made by POLE against bills or (signed) receipts.

### **Cost of Living and Accommodation**

Thanks to the financial support of sponsors and the corporate partner CEMEX, POLE is able to partially subsidize the cost of living during the physical presence in Guadalajara and Switzerland and those for the documentations and hand-outs for the participating students.

### **Insurance**

Note: Each participant is responsible for her/his own insurance matters.

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# 2016 POLE



discover something?

