



Co-funded by the
Erasmus+ Programme
of the European Union



Curriculum Development of Master's Degree Program in Industrial Engineering for Thailand Sustainable Smart Industry

Project-Based Learning (PBL) models: the integrated
development of competences

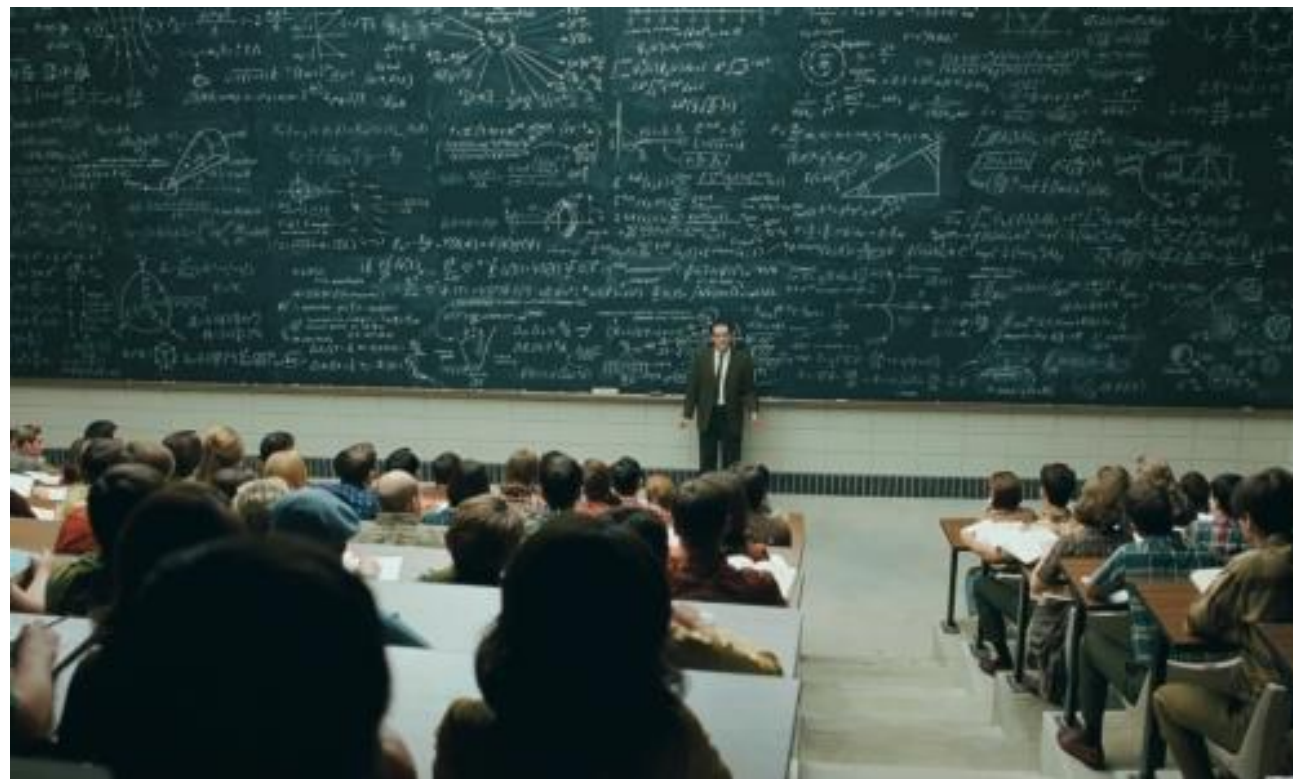
Rui M. Lima, Diana Mesquita



Curriculum Development
of Master's Degree Program in
Industrial Engineering for Thailand Sustainable Smart Industry







<https://www.campusexplorer.com/college-advice-tips/307A0500/How-College-Class-Size-Impacts-Your-Learning/>



<http://web.mit.edu/edtech/casestudies/teal.html>

TEAL Classroom @MIT Technology-Enhance Active Learning

From here

To there



Education frontloaded in early life

Learning throughout life



10 TRENDS TRANSFORMING EDUCATION AS WE KNOW IT

https://ec.europa.eu/epsc/publications/other-publications/10-trends-transforming-education-we-know-it_en



Lecture-based, theoretical, passive learning

Experiential, immersive learning; interactive, participatory courses and seminars; labs and simulation games across all disciplines



Teachers as lecturers

Teachers as learning coaches and mentors



Standardised, mass approach to learning

Customised, individualised learning



Discipline-based, focused on subjects and expertise

Competency-based, multi-disciplinary, project-based and digitally-enabled learning



- **Active Learning – Meaningful Experiences**
 - **Context** – adequate environments
 - **Engagement** – energy and motivation
 - **Relevance** – why should I learn this?
 - **Critical thinking** – reflect about their own learning

Felder & Brent (2009), Prince (2004), Prince & Felder (2006), Bonwell & Eison (1991), Christie & de Graaff (2017)

“The Active Learning Continuum” Prince (2011)

Link: <https://www.asee.org/documents/conferences/annual/2011/plenary-michael-prince.pdf>

Make the lecture
active

Informal group
activities

Structured team
activities

Problems drive the
course



Quiz
Think Pair Share
...

Brainstorming

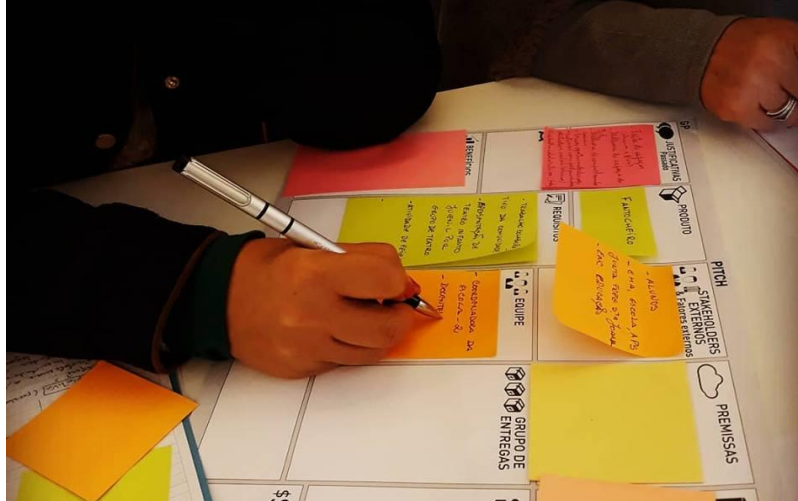
Flipped Learning

Team Based Learning (TBL)

Problem and Project-
Based Learning (PBL)



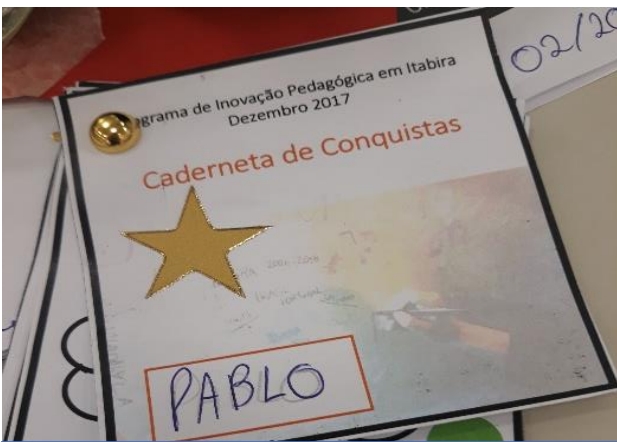
Brainstorming



Problem and Project Based Learning



Research-based Learning



Gamificação

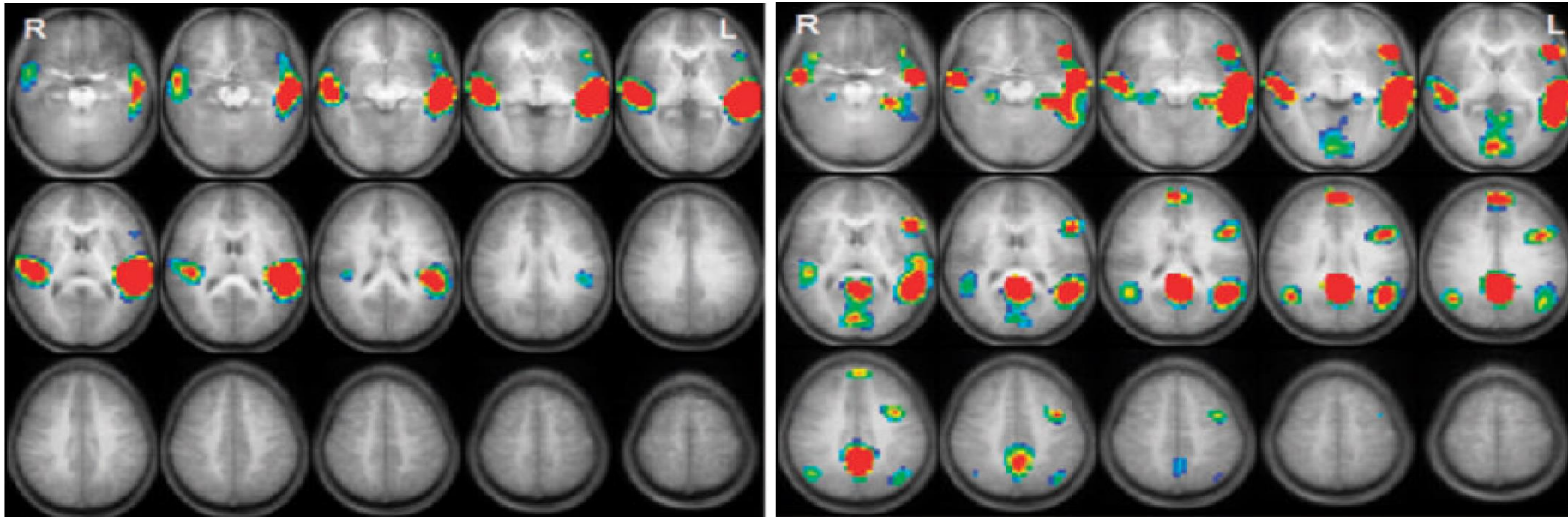


Role Playing



Gallery Walk

Active Learning Works?



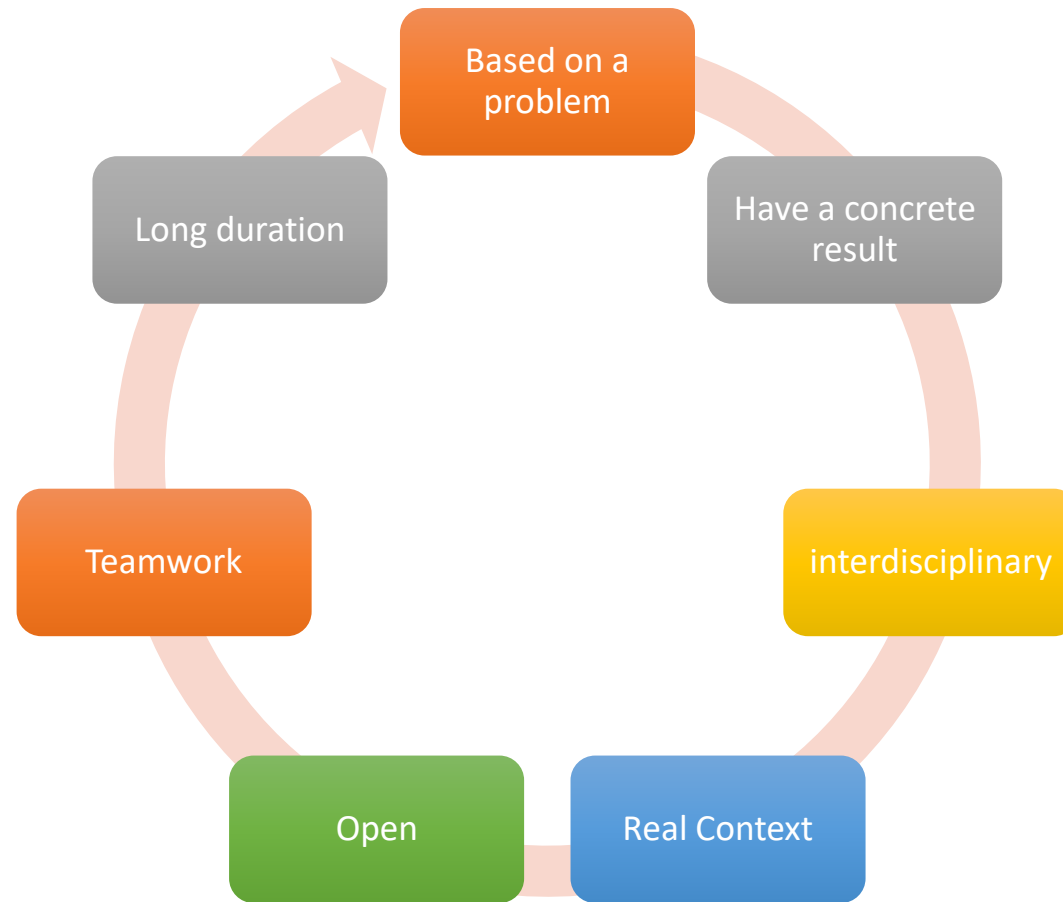
Vannest, et al. (2009), Comparison of fMRI data from passive listening and active-response story processing tasks in children. *J Magn Reson Imaging*, 29(4), 971–976. doi:10.1002/jmri.21694.

Based on a meta-analysis of the data published in 225 studies, Freeman et al. (2014) refer that active learning increases the performance in exams... and lectures increase the failure rate in 55%.

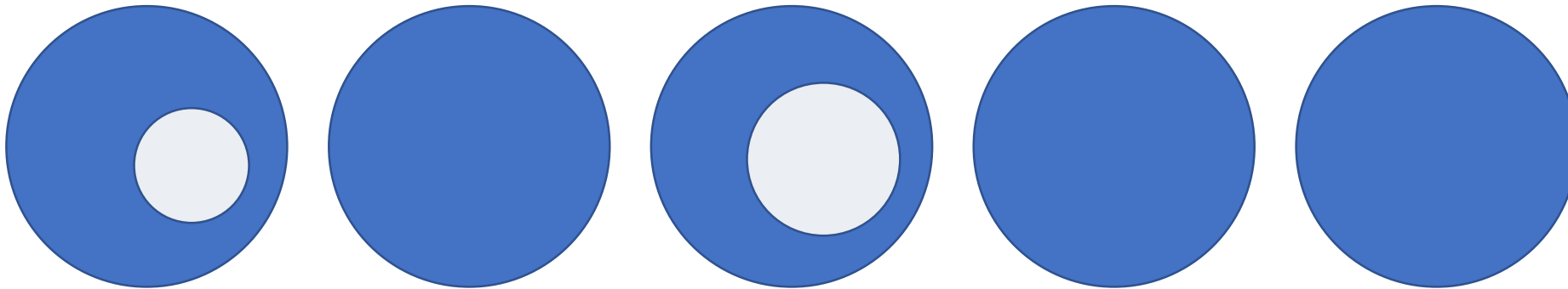
Active Learning Works?



PBL – Project Based Learning



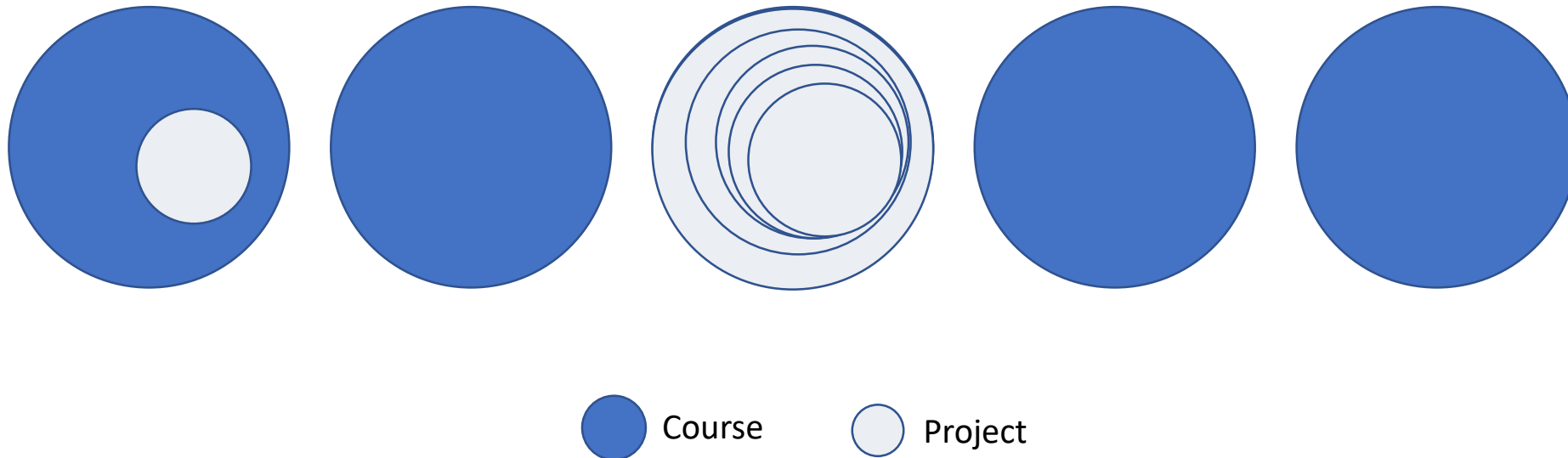
An exercise of project



 Course  Project

Kolmos, 1996; Helle, Tynjälä, & Olkinuora, 2006.

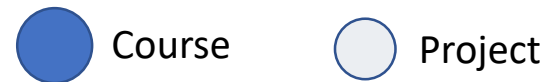
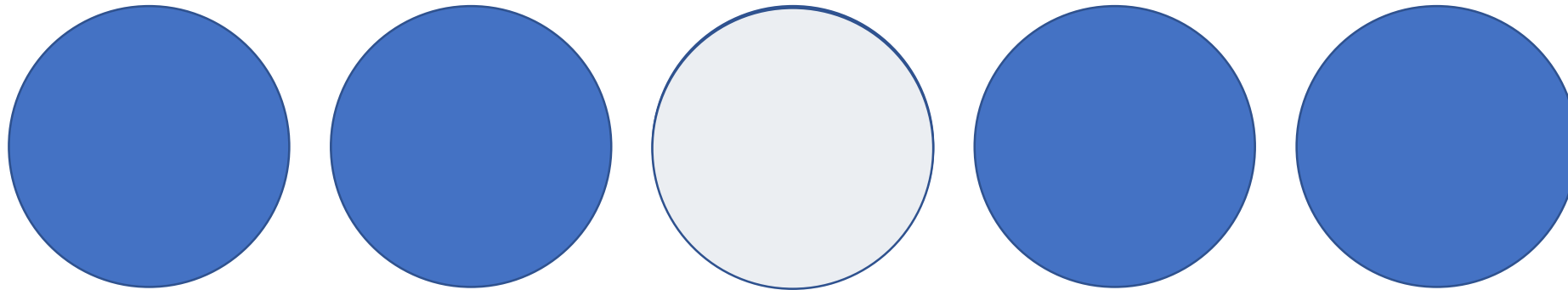
A course as a project



Kolmos, 1996; Helle, Tynjälä, & Olkinuora, 2006.

Project types

Interdisciplinary project approach



Kolmos, 1996; Helle, Tynjälä, & Olkinuora, 2006.



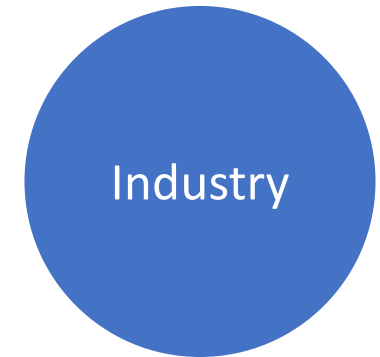
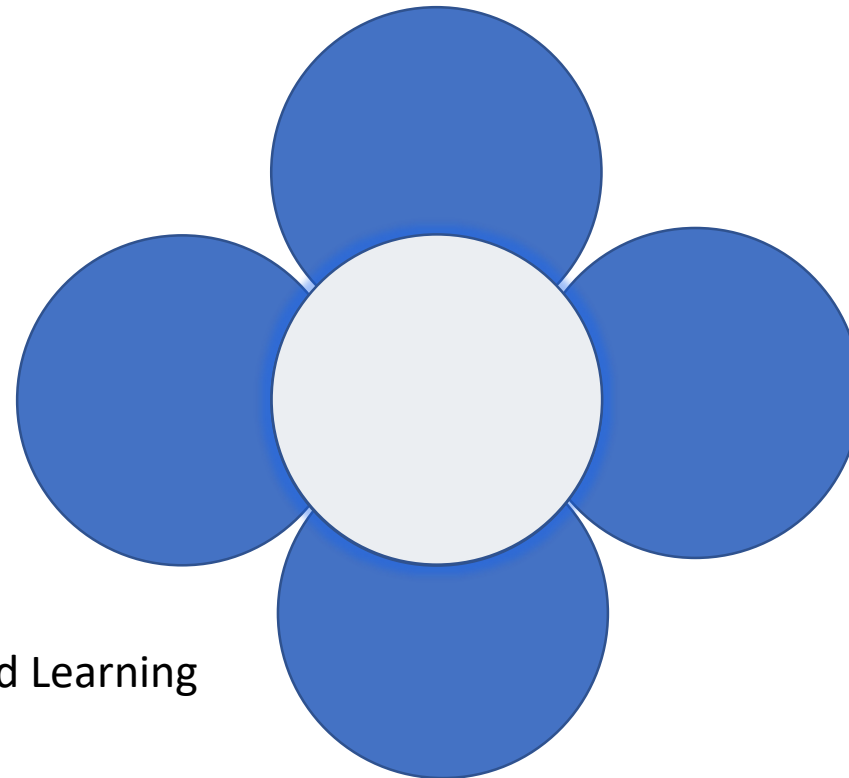
Project types

Interdisciplinary project approach



University of Minho
School of Engineering

PBL@IEM.UMINHO – Project Based Learning



Kolmos, 1996; Helle, Tynjälä, & Olkinuora, 2006.



PBL Model - IEM-IM

Curricular Unit – SEMESTER 7

Ergonomic Workplace Analysis

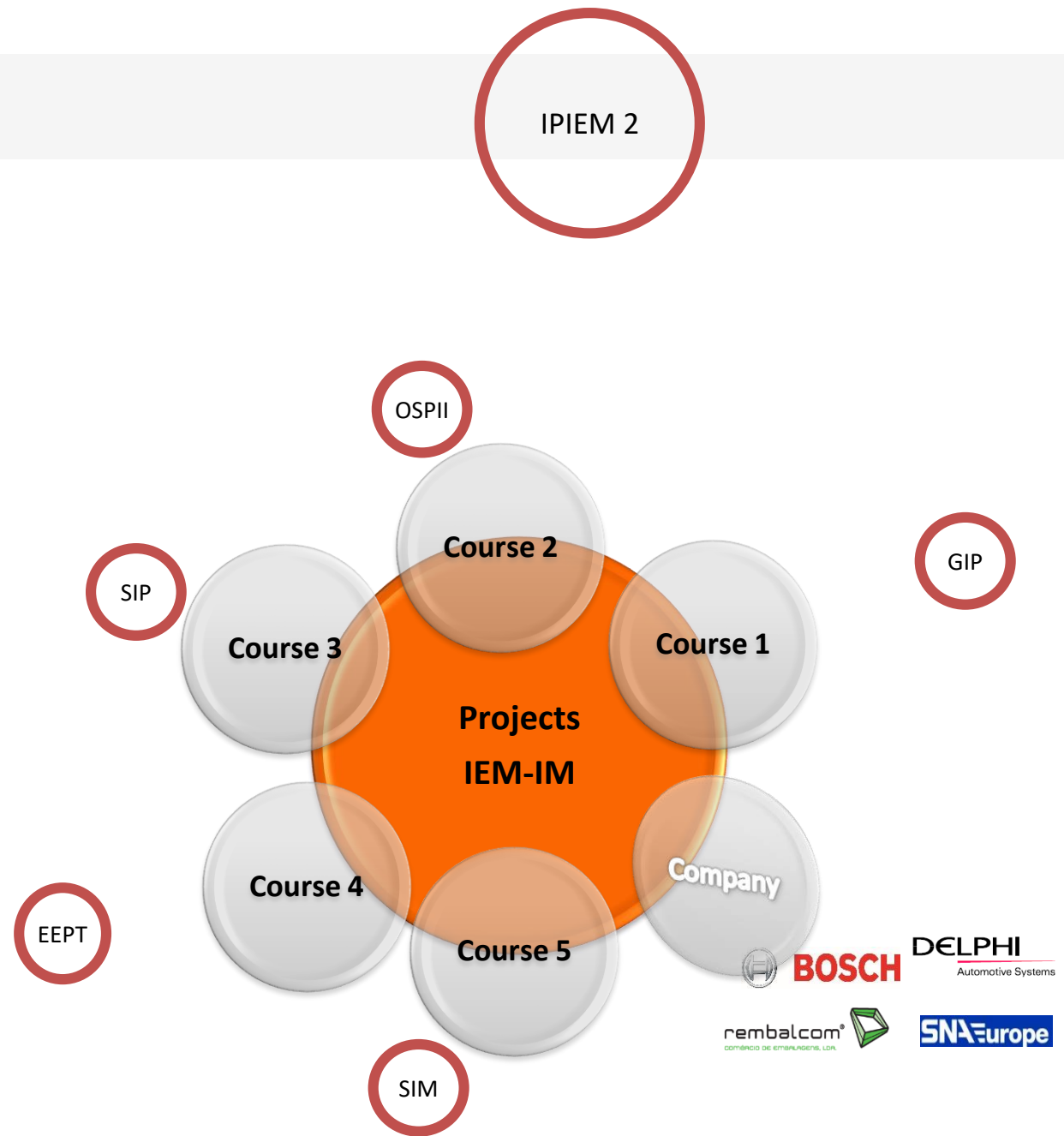
Integrated Production Management

Production Information Systems

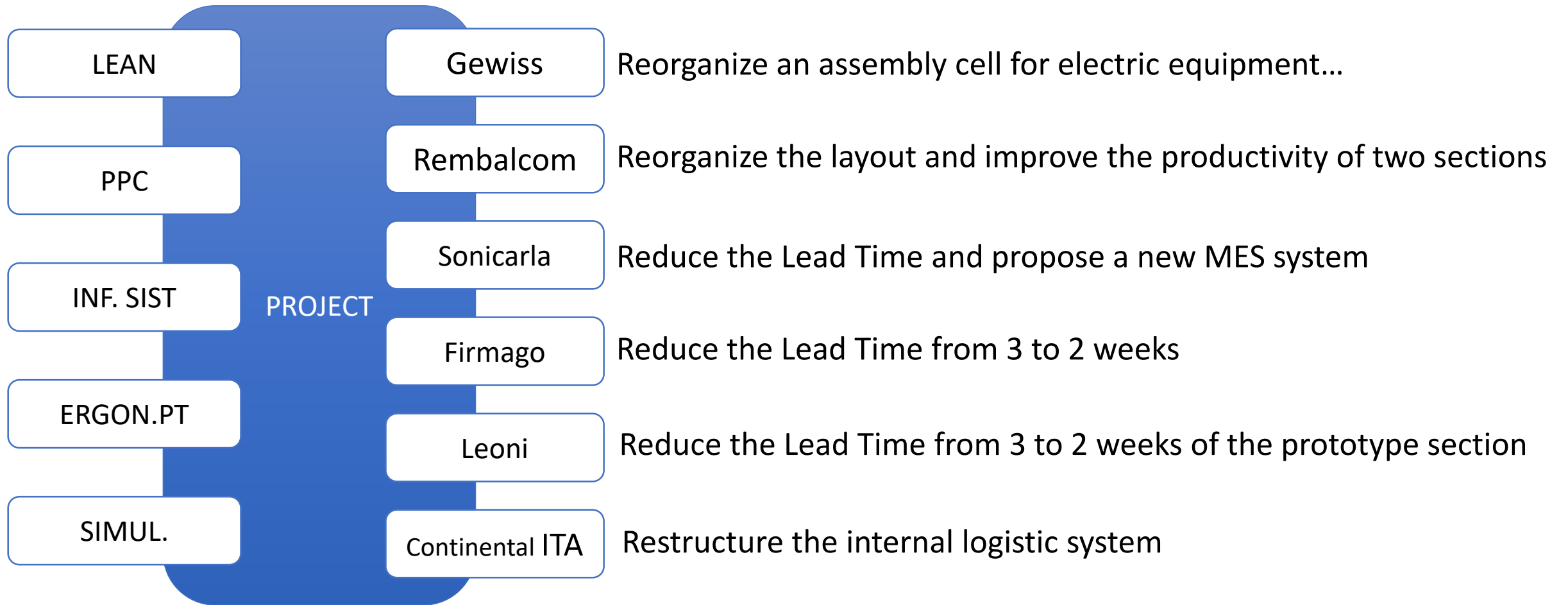
Production Systems Organization II

Simulation

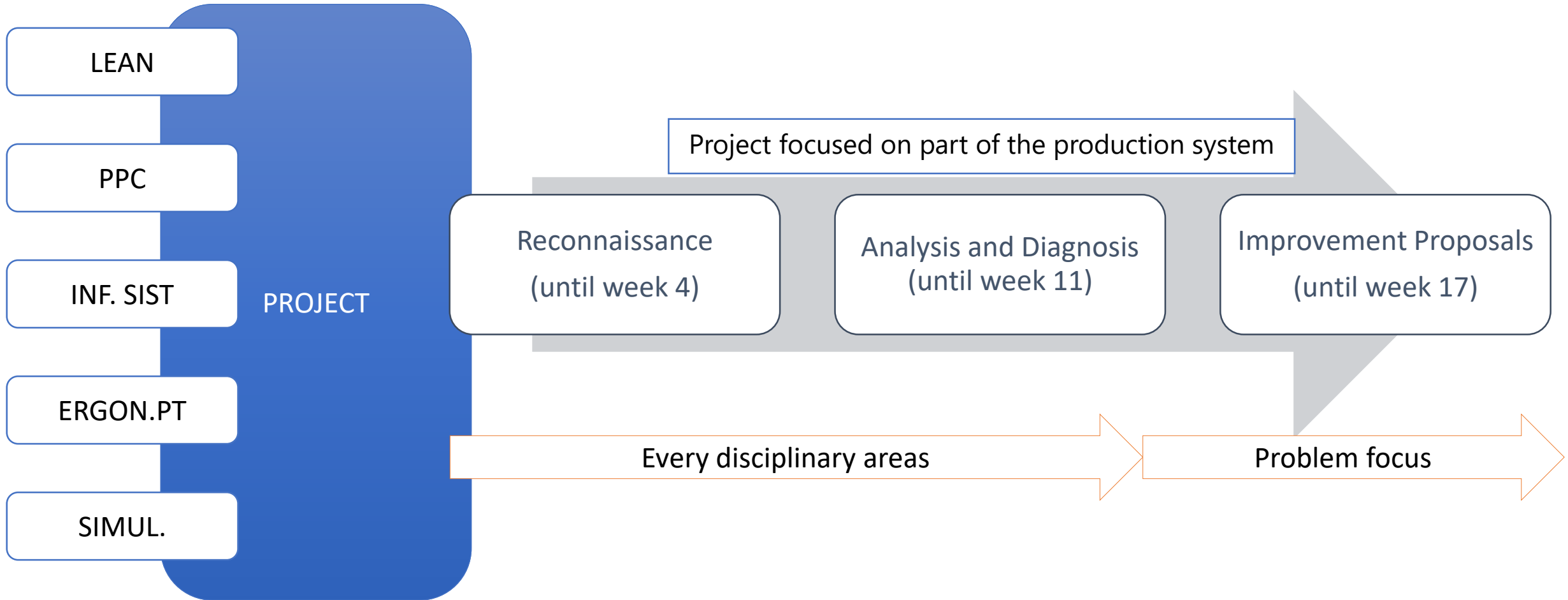
Integrated Project in Industrial Engineering
and Management II



UMinho MIEGI_PBL – 7th Semester



UMinho MIEGI_PBL – 7th Semester





Final Video 4º Year : https://youtu.be/BTFnEzt_TGY

Team 1: André Martingo, André Lopes, Edma Tarin, Micael Gonçalves, Nuno Silva, Ricardo Crista, Ricardo Santos, Sérgio Marques.

- Active Learning ... Project-Based Learning (PBL) works!

Teacher is more than an expert

“True knowledge exists in knowing that you know nothing.” – Socrates

Students with a growth mindset

“If I have seen further than others, it is by standing upon the shoulders of giants.” – Isaac Newton



PAEE/ALE' 2019

"Preparing Teachers and Students for Challenging Times in Engineering Education"

10-12 June 2019 - Hammamet, Tunisia

<https://paeale.esprit.tn/>

(SCOPUS indexed)

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