Research-Based Learning

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- How to implement research in teaching
- Students in R&D projects
- Didactic concept
- Project-oriented courses in teaching <-> LSRI

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How to implement research in teaching

\[ F_D = \frac{1}{2} \rho C_D A \cdot \nu^2 \]

\[ P_D = F_D \cdot \nu \]

\[ = \frac{1}{2} \rho C_D A \cdot \nu^3 \]

\[ \nu > 400 \text{ km/h} \Rightarrow E_{loss} > 83\% \text{ due to air friction} \]
Hyperloop evolution

603 km/h

> 1080 km/h
Hyperloop - the answer?

- Mobility
- Climate change
- Energy
- Socio-economics
- ...

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Benefits for student projects in R&D

• Research support
  • Resource expansion

• Motivation for students
  • e.g. Hyperloop technology => impact on a global scale

• The competition idea fosters
  • Interdisciplinarity
  • Innovation
  • Personal maturness
  • Career prospects
    • Opportunities on the job market
    • Startup - team members found companies
Didactic concept

- Sound knowledge in
  - Engineering, Natural Sciences, Management, etc.
- Use course competitions as motivation:
  - Seminar task: "Who finds the best parameter field for max. cutting speed under given quality level"
  - Design competitions
- (Inter)national competitions
  - Solar boat race
  - Battery-powered screwdriver race
  - Hyperloop Pod Competition

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Upscaling the concept

- Suprastructure and civil engineering
- Low pressure environment
- Fluid dynamics
- Propulsion and braking
- Levitation and suspension
- Guidance and switching
- Pod motion physics

- Power generation and supply
- Air locks and transfer
- Environmental control and life support systems (ECLSS)
- Network communication and control systems
- Safety and emergency management
- ...
Lathen - the cradle of EU Hyperloop
Integration of R&D Centres in Teaching

- Curricular Integration of large-scale research centers into teaching
  - MagLev test track (Lathen) is a seminar
- Lectures, practicals, and competition
  - Expansion of laboratory capacities
- International cooperation (satellites)
  - Involvement of European industry
  - Networking
  - Innovation
- Development of young talent ??
  - Academic staff recruitment

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ePIcenter - EU research project

“ePIcenter explores opportunities provided by AI, digitalisation, automation and innovations in freight transport and handling technologies, creating powerful solutions to enable transparent, efficient and greener supply chains.”

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Be part of an innovative model in teaching, research, and development

Welcoming students, colleagues, and project participation

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