FACULTY OF TRANSPORTATION SCIENCES CTU IN PRAGUE

Iceland Liechtenstein Norway grants

DŮM ZAHRANIČNÍ SPOLUPRÁCE D Z S

TEACHING COURSE THROUGH CBL APPROACH

"URBAN PLANNING FOR CLIMATE CHANGE"

2ND PEER-LEARNING ACTIVITY OF THE PROJECT

"ACADEMIC DEVELOPMENT THROUGH BILATERAL PEER-LEARNING ACTIVITIES ON MISSION-ORIENTED INNOVATION FOR CLIMATE NEUTRAL AND SMART CITIES"

INSTITUTIONAL COOPERATION PROGRAMME WITHIN EEA & NORWAY GRANTS

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CONTENT

Teaching the course on Urban Planning for Climate Change through CBL approach

- Course objectives
- Course content per modules
- Teaching the course through CBL approach

URBAN PLANNING FOR CLIMATE CHANGE

Course objectives

- To provide an updated knowledge on the climate change impacts on urban areas and infrastructure
- To develop essential skills among students to work with the most appropriate policies, strategies and tools that can contribute to the improvement of climate change mitigation efforts by citizens and to the enhancement of resilience to climate change effects.
- It addresses the opportunities and obstacles in the integration and application of smart technologies in the urban efforts towards climate change mitigation and adaptation.
- It explores the new trends in urban planning with the support of smart technologies for climate change mitigation and adaptation.

URBAN PLANNING FOR CLIMATE CHANGE

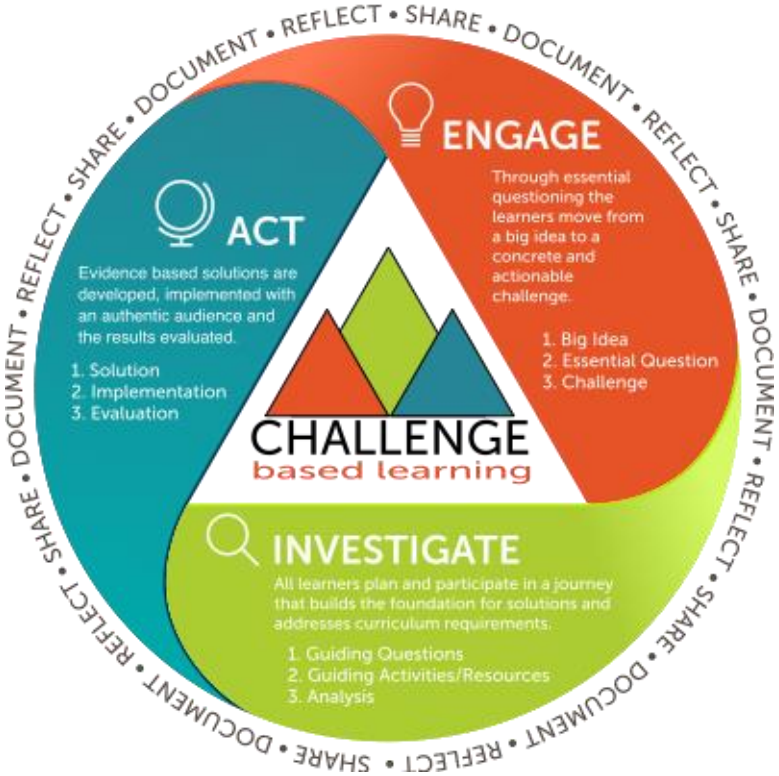
Course content per modules

- Module 1: Climate change impacts on urban areas and infrastructure
- Module 2: Climate Change adaptation and mitigation -Introduction, key principles and terms
- Module 3: Climate Change Mitigation Policies (non-market based and market-based policy instruments)
- Module 4: Regional Policies and Strategies for Climate Change Adaptation
- Module 5: Climate Change in context of Smart Cities
- Module 6: Planning tools for climate change mitigation and adaptation

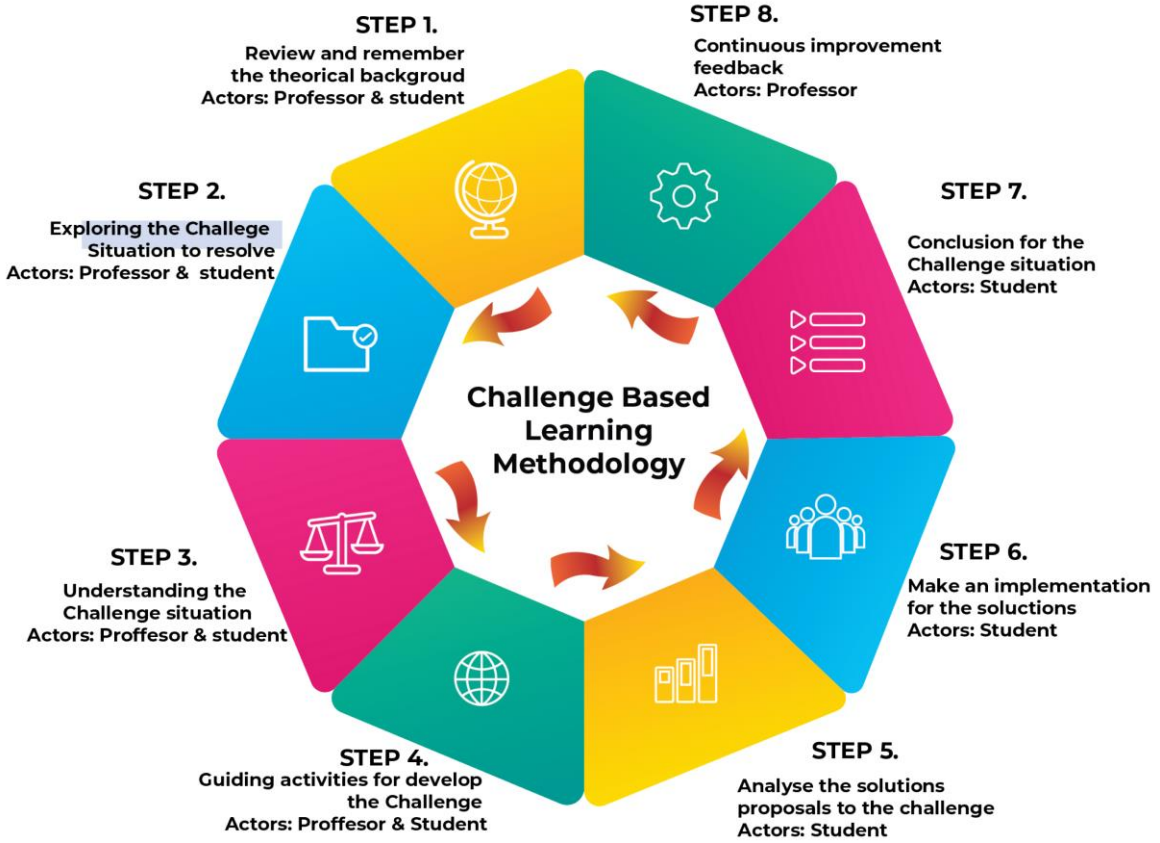
URBAN PLANNING FOR CLIMATE CHANGE

Teaching the course through Challenge-based Learning Approach

- CBL Framework



Source: Nichols, M., Cator, K., and Torres, M. (2016) Challenge Based Learner User Guide. Redwood City, CA: Digital Promise.



Source: Gutiérrez-Martínez, et al. (2021). A Challenge-Based Learning Experience in Industrial Engineering in the Framework of Education 4.0. Sustainability. 13. 10.3390/su13179867.

CLIMATE CHANGE ADAPTATION IN PUBLIC TRANSPORT

Phase 1: Engage

- Big idea: Resilience of public transport system in a city
- Essential questioning (round 1): How public transport in a city can reduce adverse effects of climate change?
- Challenge: help a city to have a resilient public transport with reduced interruptions in operation of services due to climate change.
- Essential question (round 2): How public transport in a city can harness beneficial opportunities from climate change?
- Challenge: help the public transport system of a city to be resilient with reduction of its greenhouse gas emissions and reduction of its energy bills with public transport.

Moving from an abstract Big Idea to a concrete and actionable Challenge using the Essential Questioning process.

It is also possible to work backward starting with challenge and discover the essential Question and Big Idea.

CLIMATE CHANGE ADAPTATION IN PUBLIC TRANSPORT

Phase 2: Investigate

- Guiding Questions
- How different public transport systems and infrastructure can be affected by climate change?
- What does it mean for a public transport service to be resilient?
- Which factors contribute to the resilience and reliability of public transport service?
- What are the major risks and effects for different groups of stakeholders by lack of resilience of public transport services?
- What is the role of each stakeholder group in the enhancement of resilience of public transport system?
- Gather responses by students for different types of public transport systems (buses, light rail, subways, ferries, etc).
- Examples of categories of guiding questions: science, technology, education, health, economics, etc.

- ❑ Development of an own contextualized learning experience and the conduct of rigorous, content- and concept-based research to create a foundation for actionable and sustainable Solutions.
- ❑ Preferentially the guiding questions should be generated by students – as many guiding questions as possible.
- ❑ Then consolidate similar questions and develop categories of questions.
- ❑ Prioritize the questions between “must know” and “good to know”

CLIMATE CHANGE ADAPTATION IN PUBLIC TRANSPORT

Phase 2: Investigate

- Guiding activities and resources
- Indexed academic journals: Scopus, ScienceDirect, Web of Science, etc
- Open online social networking services: ResearchGate, Academia, Scribd.
- Online databases: EM-DAT, The International Disaster Database, Transport database Eurostat, Transitland, TransitFeeds, OpenStreetMap, Planet OSM, among others.
- MOOC on Nature-based Solutions for Disaster and Climate Resilience (UNEP), MOOC on Solutions for Carbon Neutral Transport (LUT University), MOOC on Designing Climate-Neutral Building and Transport (TU Delft University), among others.

- ❑ The guiding activities are defined for the highest priority questions.
- ❑ Guiding activities can include simulations, experiments, projects, problem sets, research, games, expert interviews, surveys, lectures, and textbook assignments.
- ❑ Examples of resources: online databases and journals, online courses, the school or public library, social networks, opinion of experts.
- ❑ The Guiding activities should be helpful in answering the Guiding Questions in order to develop an innovative, insightful, and realistic solution.

CLIMATE CHANGE ADAPTATION IN PUBLIC TRANSPORT

Phase 2: Investigate

- Analysis
- Align the questions and activities with curriculum goals and research analysis.
- Learners analyze the accumulated data and identify thematic areas to address.
- Examples of thematic areas:
  Types of climate change impacts in public transport systems: heat waves, rising sea level, intensity of precipitation, increasing hurricane intensity.
- Types of public transport modes: buses, subways, commuter trains, light rails, van pool services, ferries, etc.
- Groups of stakeholders affected: governmental bodies, civil society, companies and the private sector.

- ❑ Guiding Questions may need to be modified or new ones added to address all of the standards or curriculum goals.
- ❑ Provide sufficient structure and time for the Learners to conduct the necessary research to answer the highest priority Guiding Question in each category.
- ❑ Research findings should be recorded and shared among the group and with the teacher.
- ❑ Regular meetings to ensure that all of the Learners are doing adequate research and help to keep the process on track and organized

CLIMATE CHANGE ADAPTATION IN PUBLIC TRANSPORT

Phase 3: Act

- Solution, Implementation and Evaluation
- Encourage learners to develop solution concepts per category, such as:
  - Education (aimed at enhancing human behaviour towards CG)
  - Policy (aimed at fostering eco-friendly investment and behaviour)
  - Technology (aimed at fostering innovation for solutions with ICT and technical devices)
  - Materials (aimed at fostering improvements in transport infrastructure)
  - Implementation plan for each solution may include: target audience, dates, activities, costs, anticipated difficulties, and the responsibilities of each team member.
  - Research plan: Measurement of the outcomes of proposed solutions and the impact on the challenges. Use of questionnaires and interviews for gathering feedback to solutions.
  - Record measurements and observations on notebooks and in online workspaces (e.g. project groups in Microsoft Teams).

- ❑ Learners develop grounded Solutions and implement them in authentic settings, receive feedback, and learn from their successes and failures.
- ❑ Encourage the learners to be creative in designing the Solutions while ensuring that they remain true to their research findings and actionable within the parameters provided.
- ❑ Refinement process: The iterative process of prototypes, experiments and tests may rise new Guiding Questions requiring further research and swing them back into the Investigation Phase.

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ACCORDING TO THE UN ENVIRONMENT PROGRAMME (UNEP), "BY 2050, WITH A PROJECTED INCREASED GLOBAL POPULATION OF 9.6 BILLION, WE WOULD NEED THE EQUIVALENT OF ALMOST 3 PLANETS WORTH OF RESOURCES TO SUSTAIN OUR WAY OF LIVING, IF OUR CURRENT CONSUMPTION AND PRODUCTION PATTERNS REMAIN THE SAME."

Thank you!

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