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Enhancing of Mine Ventilation Training by Using VentSim™-Software and Intensive E-Learning

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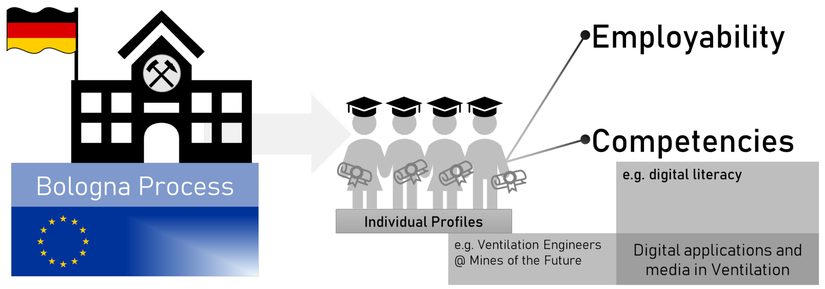
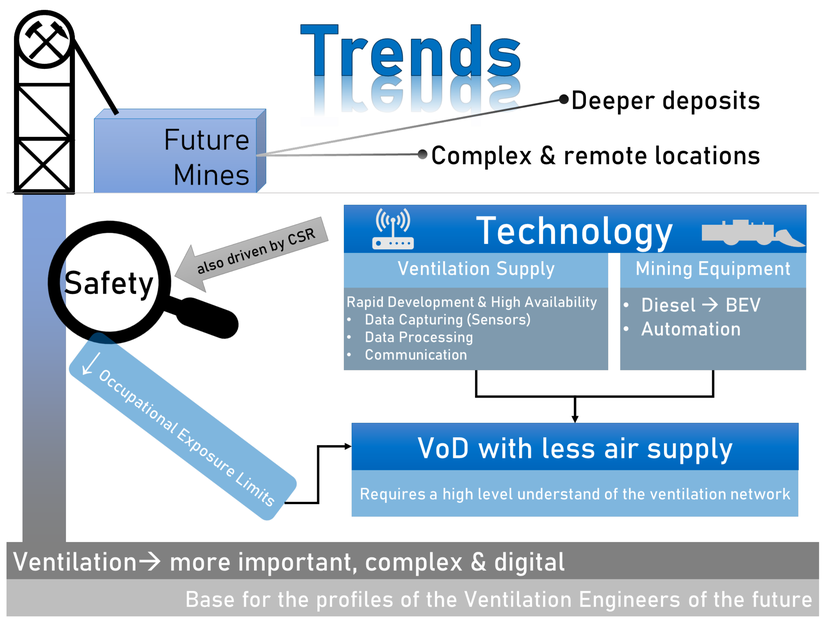
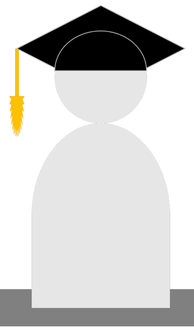
MISSION OF EUROPEAN MINING UNIVERSITIES





OBJECTIVES FOR VENTILATION COURSES

After the **Bachelor's** course, the student hold the fundamental technical and methodological skills to design and evaluate ventilation networks for different applications to support the ventilation departments of mines.



After the **Master's** course, the student are able to design and evaluate ventilation networks for different applications with analog methods as well as appropriate software to responsibly conduct the task of a ventilation engineer in a mine.

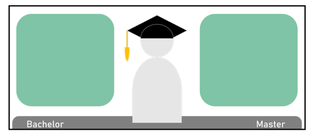
Bachelor — Master

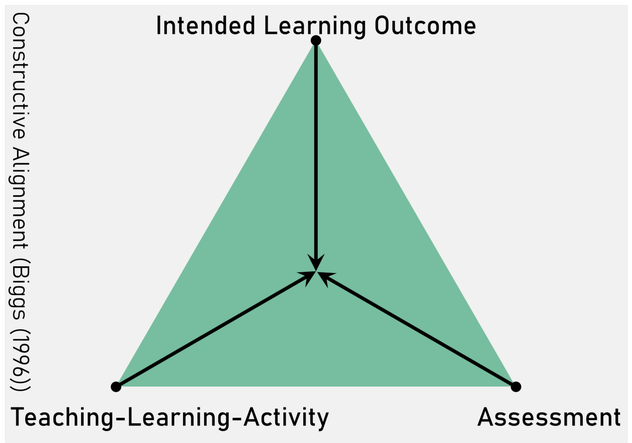
VENTILATION EDUCATION @ CLAUSTHAL UNIVERSITY OF TECHNOLOGY

Bachelor's	Level	Master's
Energie und Rohstoffe (engl.: Energy & Raw Materials)	Program	Mining Engineering
5th Semester	Semester	2nd Semester
4 ECTS / 120 working hours	Extent	6 ECTS / 180 working hours
German	Language	English

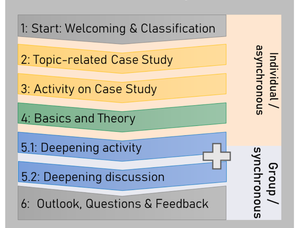
Classroom activities + E-Learning (Moodle, StudIP) + Research & Teaching Mine (VentSIM™)

METHODOLOGY





General Methodology for each topic



- Identification of 7 fundamental topics based on future trends
- Introduction in Bachelor's Course
- Deepening and Application in VentSIM™ in Master's Course

Practical Part

Bachelor's	Master's
Calculation based task	Software based task

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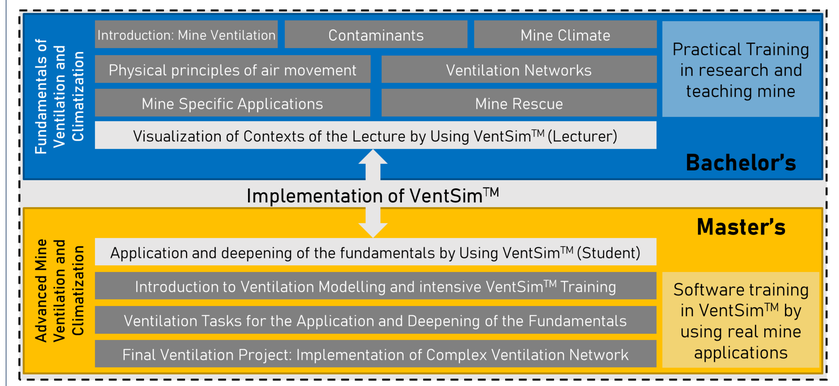
Oral Examination

TU Clausthal
Clausthal University of Technology

RESULTS



Bachelor's

- Successful implementation in winter 2020/21
- Consistent positive feedback
- Improved grades / less fails

- Time-intense implementation on the run
- Possibility for "contact-less" learning
- Less restrictions due to COVID
- Meetings→ Quality time for questions and discussions
- Helpful support by qualified didacticians

- Currently (2021) Implementation of improved concept
- Delimitations to Software training
- Positive Feedback

Master's

Post-COVID Outlook

Future: Blended Learning including classroom sessions	Adaption to future trends by modular layout	Modern digital teaching and learning approach
Increased sustainability due to longer use of the material	Material can be reused in different settings (e.g. Life Long Learning)	More possibilities for diverse groups

SUMMARY

The presented concept uses a six-step approach addressing future relevant topics of Ventilation. Both approaches, distance and blended-learning, combine the best of both worlds. The software VentSIM™ is implemented in the fundamental as well as the advanced course with different purposes while not changing the courses to a software course. Hence, the courses contribute to the education of engineers who have the skills to work in the mines of the future. The high demand for educated students for Bachelor's and Master's theses as well as careers in this field shows the great success of the concept and the quality of mining engineering education at Clausthal University of Technology. As the concept supported education during a global pandemic with massive restrictions in the possibilities of teaching and learning it showed its sustainability for the future – whatever it might bring.

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