CHALMERS
UNIVERSITY OF TECHNOLOGY

USING ACTIVE LEARNING IN HYBRID LEARNING ENVIRONMENTS

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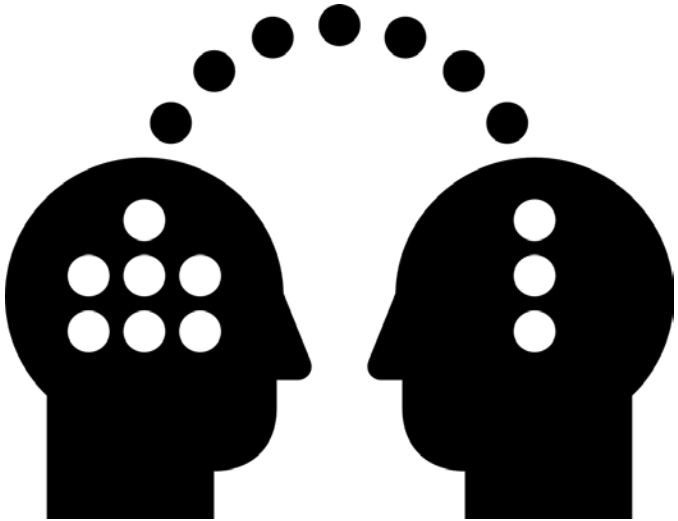
DREAM
TASK FORCE ON
DETERMINISTIC REACTOR MODELLING

BACKGROUND

- Declining student enrolment in nuclear engineering programs in Europe

➢Challenge:

  - for knowledge preservation
  - for maintaining highly specialized courses alive



BACKGROUND

- Efforts initiated at the Physics Department to teach in “hybrid” learning environments:

On-site attendance

+

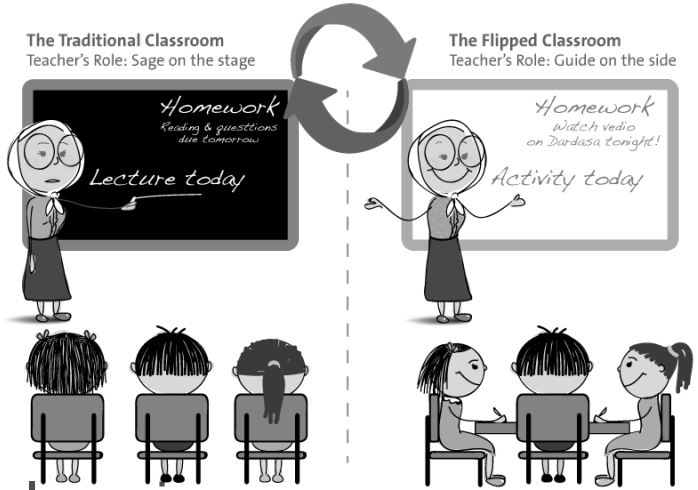
Off-site attendance

BACKGROUND

- Special interactive teaching room developed:

BACKGROUND

- Focus on favouring student learning:
  - Flipped classroom pedagogy



  - In-class active learning

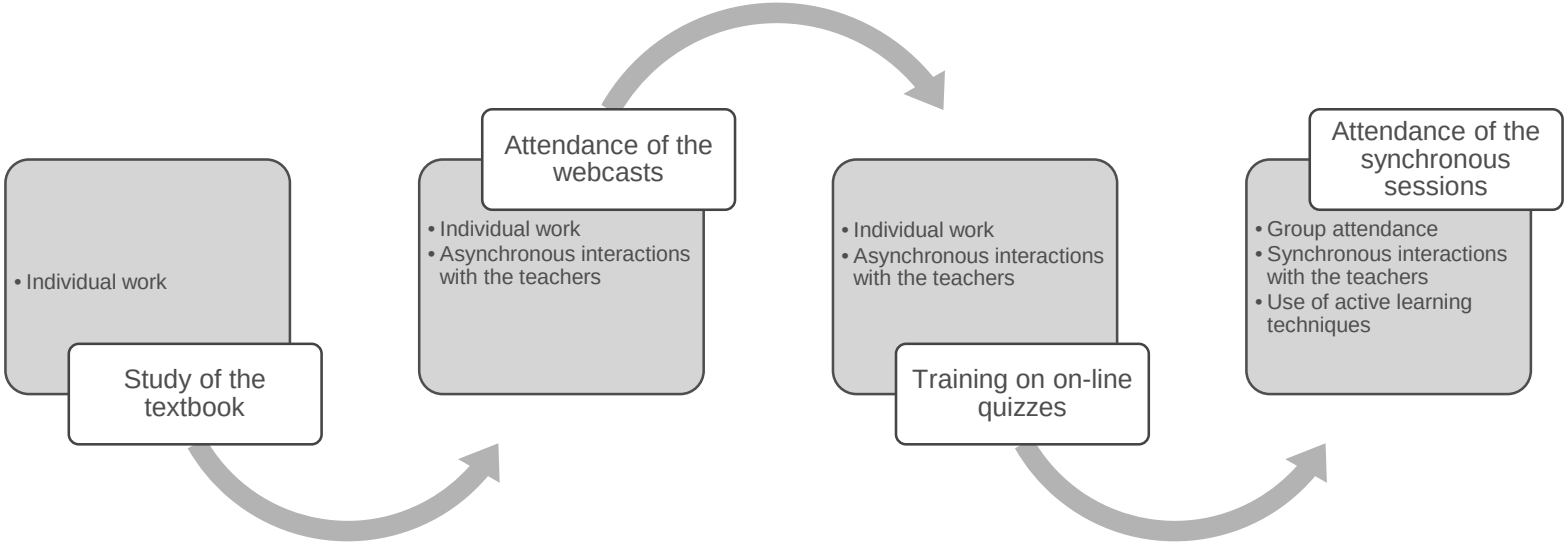
BACKGROUND

- Challenging to design active learning sessions in hybrid learning environments

- Examples of two short courses (one week each) given within two European projects (CORTEX and ESFR-SMART)
- Focus on student engagement

METHODS AND RESULTS

- Pedagogical approach used for both courses:



METHODS AND RESULTS

- Contents of the synchronous sessions:

CORTEX course

Short summarizing lectures
Discussions on quizzes
Teacher-led exercises

METHODS AND RESULTS

- Contents of the synchronous sessions:

CORTEX course

Short summarizing lectures
Discussions on quizzes
Teacher-led exercises

ESFR-SMART course

Short summarizing lectures
Teacher-led coding assignments using MATLAB Grader

METHODS AND RESULTS

- Attendance:

CORTEX course	**ESFR-SMART course**
14 on-site attendees	11 on-site attendees
10 off-site attendees	16 off-site attendees
(completing the assignments)	(completing the assignments)

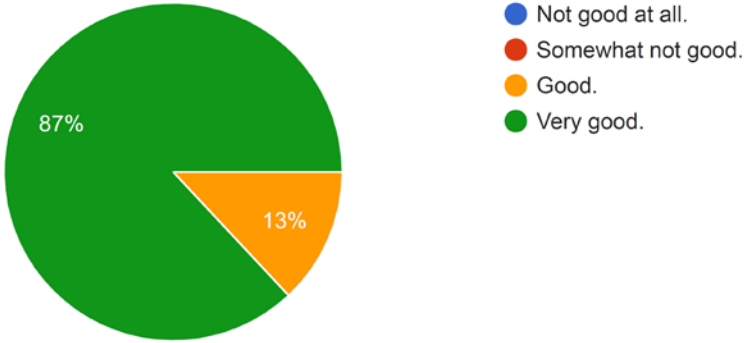
- End-of-course evaluation questionnaires:

CORTEX course	**ESFR-SMART course**
23 respondents	25 respondents
(52.2% on-site respondents)	(40% on-site respondents)

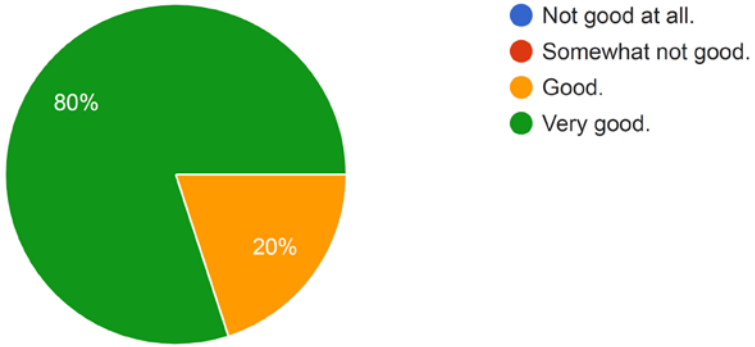
METHODS AND RESULTS

- Students' overall impression of the courses:

CORTEX course



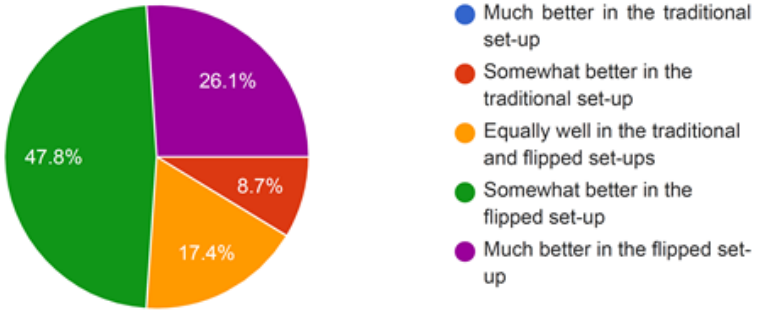
ESFR-SMART course



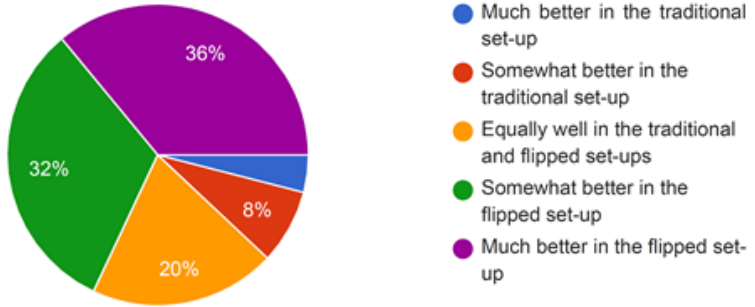
METHODS AND RESULTS

- Students' opinion about the best teaching format for learning the course concepts:

CORTEX course



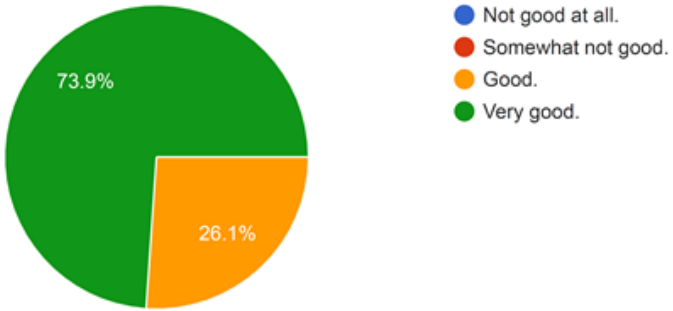
ESFR-SMART course



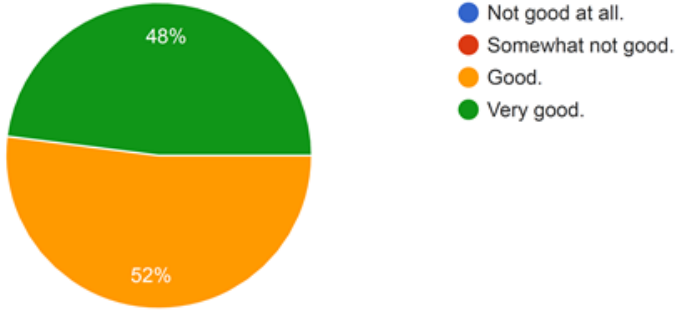
METHODS AND RESULTS

- Students' opinion about the quality of the pedagogical approach:

CORTEX course



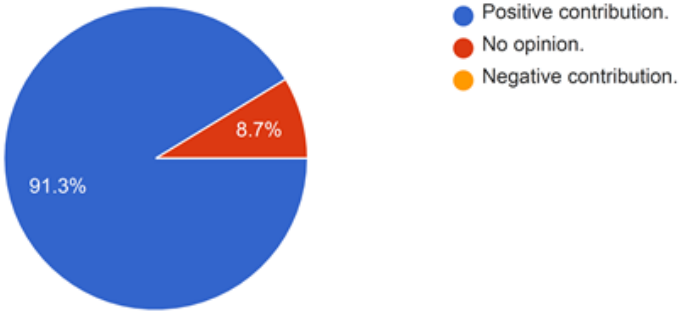
ESFR-SMART course



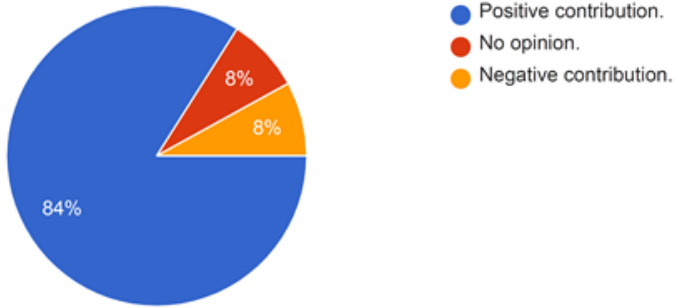
METHODS AND RESULTS

- Students' opinion about the contribution from the on-line quizzes to learning:

CORTEX course



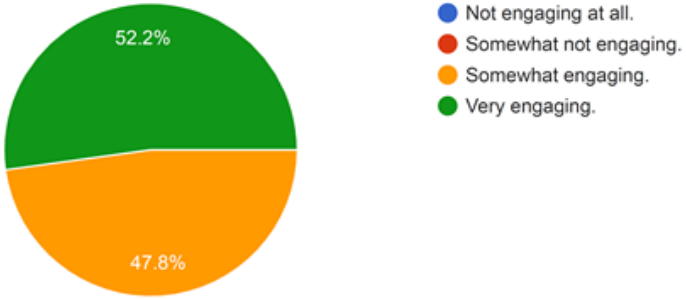
ESFR-SMART course



METHODS AND RESULTS

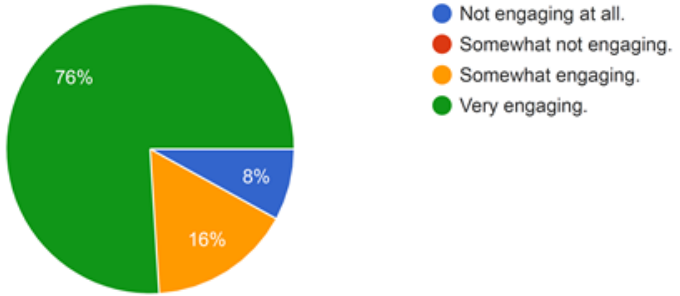
- Students' opinion about the level of engagement of the synchronous sessions:

CORTEX course



(54% of off-site attendees finding the sessions somewhat engaging)

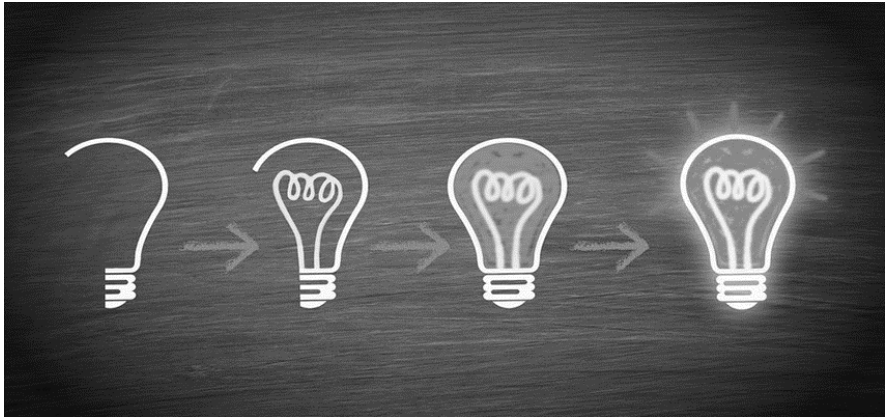
ESFR-SMART course



(33% of off-site attendees finding the sessions somewhat/not at all engaging – help from a Teaching Assistant to handle queries from remote attendees)

METHODS AND RESULTS

- Teacher's impressions:
  - Deeply engaged students
  - Rewarding for the teacher to support the students when they most need help
  - Active learning-based assignments triggered questions not necessarily related to the assignments
  - Interactions with the students/teacher occurring at a much higher level of conceptual understanding



DISCUSSION AND CONCLUSIONS

- Hybrid learning environment combined with flipped classroom setup and active learning techniques resulted in deep student engagement

- Flexibility of the format:
  - Some resources available 24/7 for self-paced learning
  - No need to travel on site

DISCUSSION AND CONCLUSIONS

- Careful preparation and planning needed
- Use of many IT resources

➢ Dedication from the teaching staff necessary

ACKNOWLEDGEMENTS

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- The CORTEX project

(Euratom research and training programme 2014-2018 under grant agreement No 754316)

- The ESFR-SMART project

(Euratom research and training programme 2014-2018 under grant agreement No 754501)

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