



20th SEFI SIG in Mathematics

Annoesjka Cabo TU Delft

June 17, 2021



MatRIC Centre for Research,
Innovation and Coordination
of Mathematics Teaching



Integrating Mathematics and Engineering Education at TU Delft: meet PRIME pre, during and post COVID-19

Annoesjka Cabo TU Delft



Overview

- Introducing the speaker
- Introducing PRIME
- Outcomes
- Effects
- Research



Introducing the speaker

Introducing

- Annoesjka Cabo
- Associate professor in Statistics
- Director of Studies Interfaculty Education
- Programme Director of PRIME

Introducing

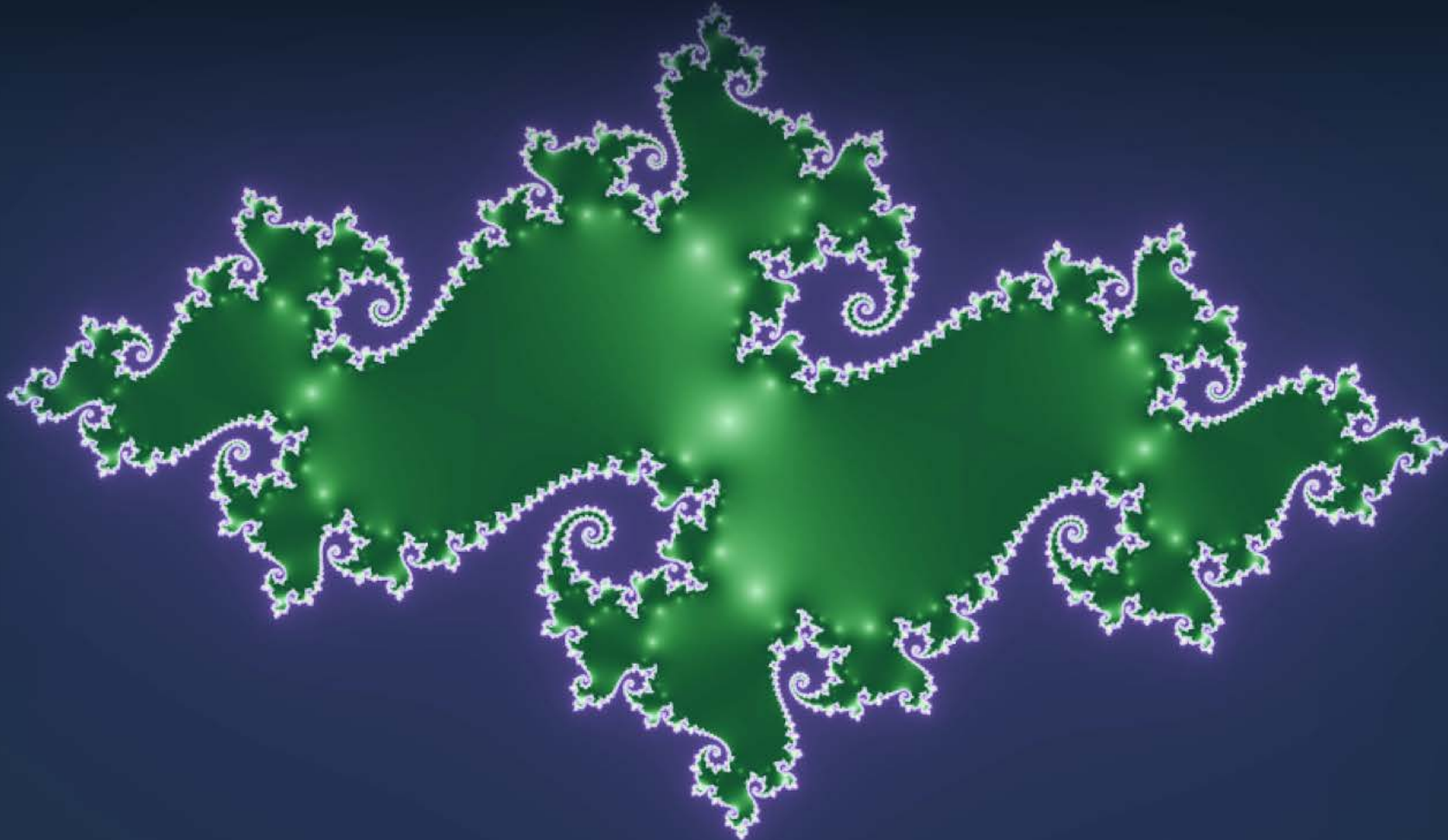
- Annoesjka Cabo
- Associate professor in Statistics
- Director of Studies Interfaculty Education
- Programme Director of PRIME
- Academic Director Teaching Academy TU Delft

Introducing PRIME

PRIME

=

PRogramme of Innovation in Mathematics Education





Programme

TU-wide
interfaculty education
20.000 students
45 courses
62.000 ECTS

Evidence-informed
Educational theory
Research
Scaling up
Team work

Innovation

Calculus
Probability & statistics
Linear algebra
Differential equations

Mathematics

Blended learning
Interactive lectures
Open source materials

Education



Goals of PRIME*

- Activate students
- Increase efficiency in learning
- Increase efficiency in teaching
- Transfer mathematics to engineering

*See <https://www.tudelft.nl/en/eemcs/the-faculty/departments/applied-mathematics/education/prime/>

Mathematics Education for Engineers

Past

Mathematics

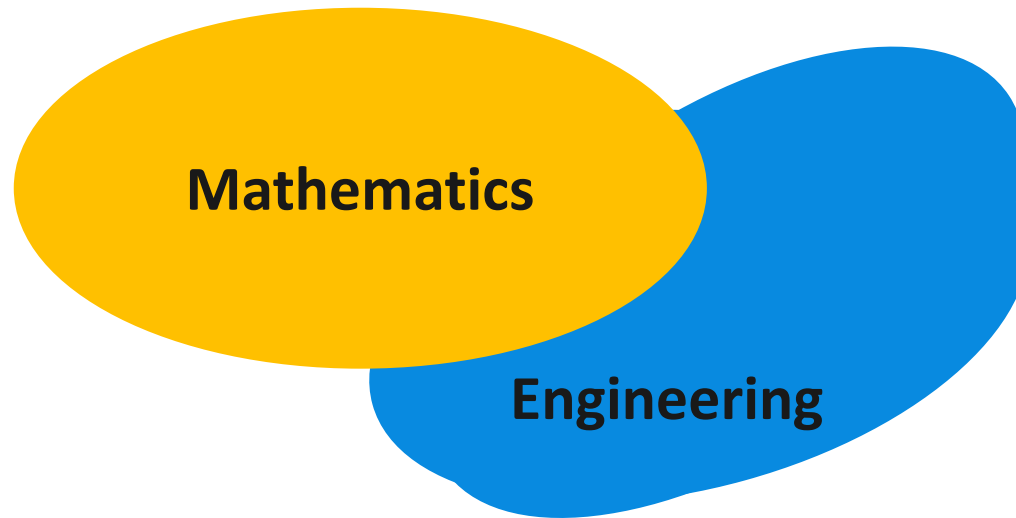
Engineering

World



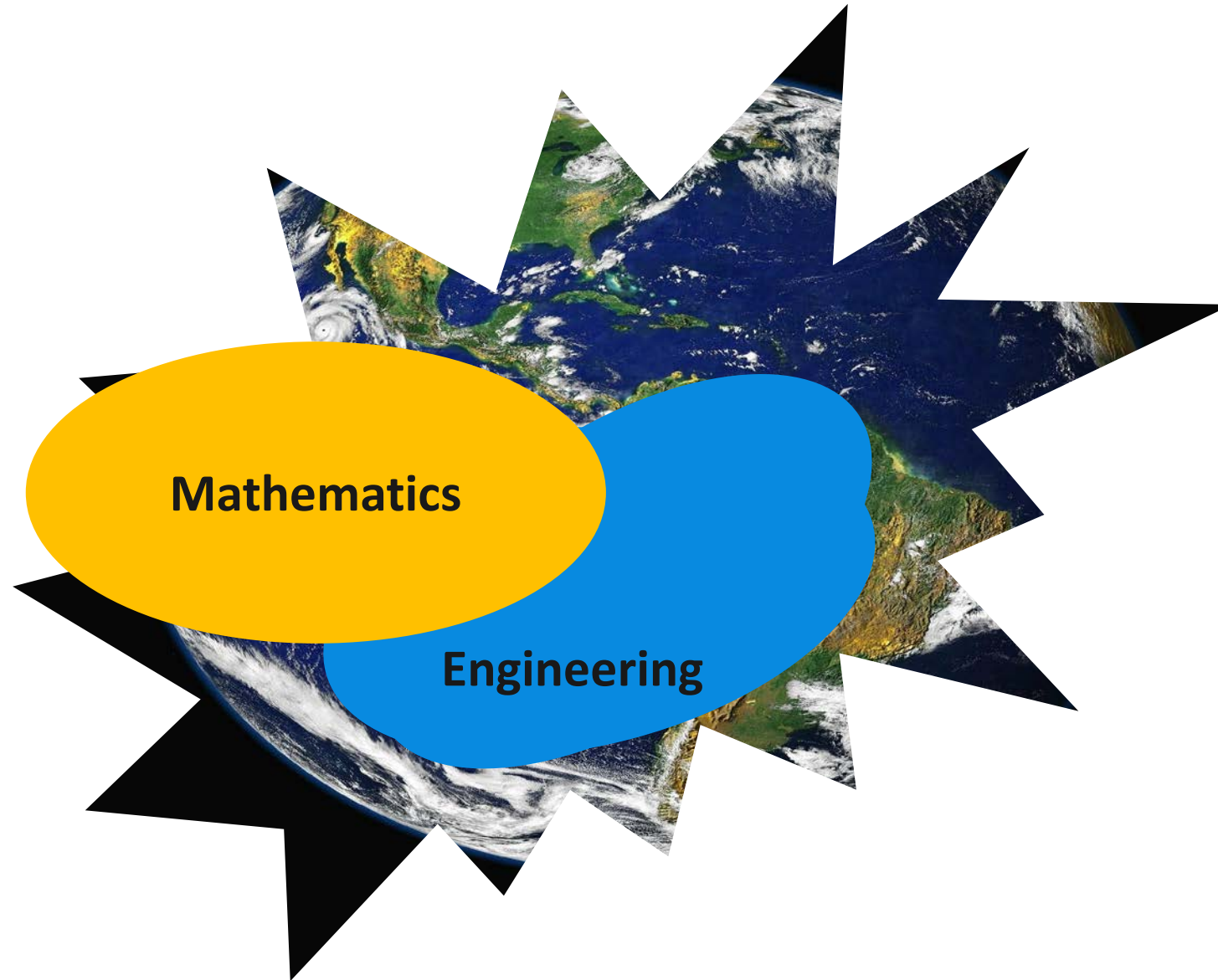
Mathematics Education for Engineers

Present



Mathematics Education for Engineers

Future

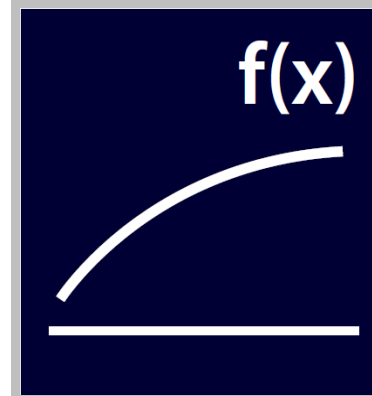


Mathematical modelling



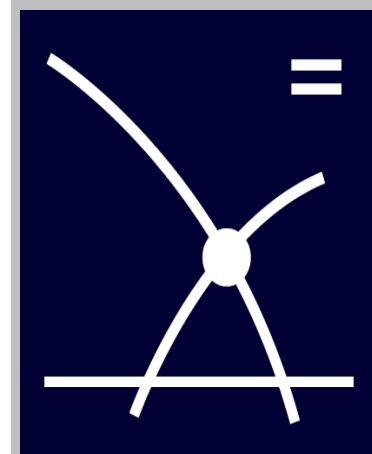
Real-world
Problem

Formulate



Mathematical
Model

Solve



Mathematical
Conclusions

Interpret



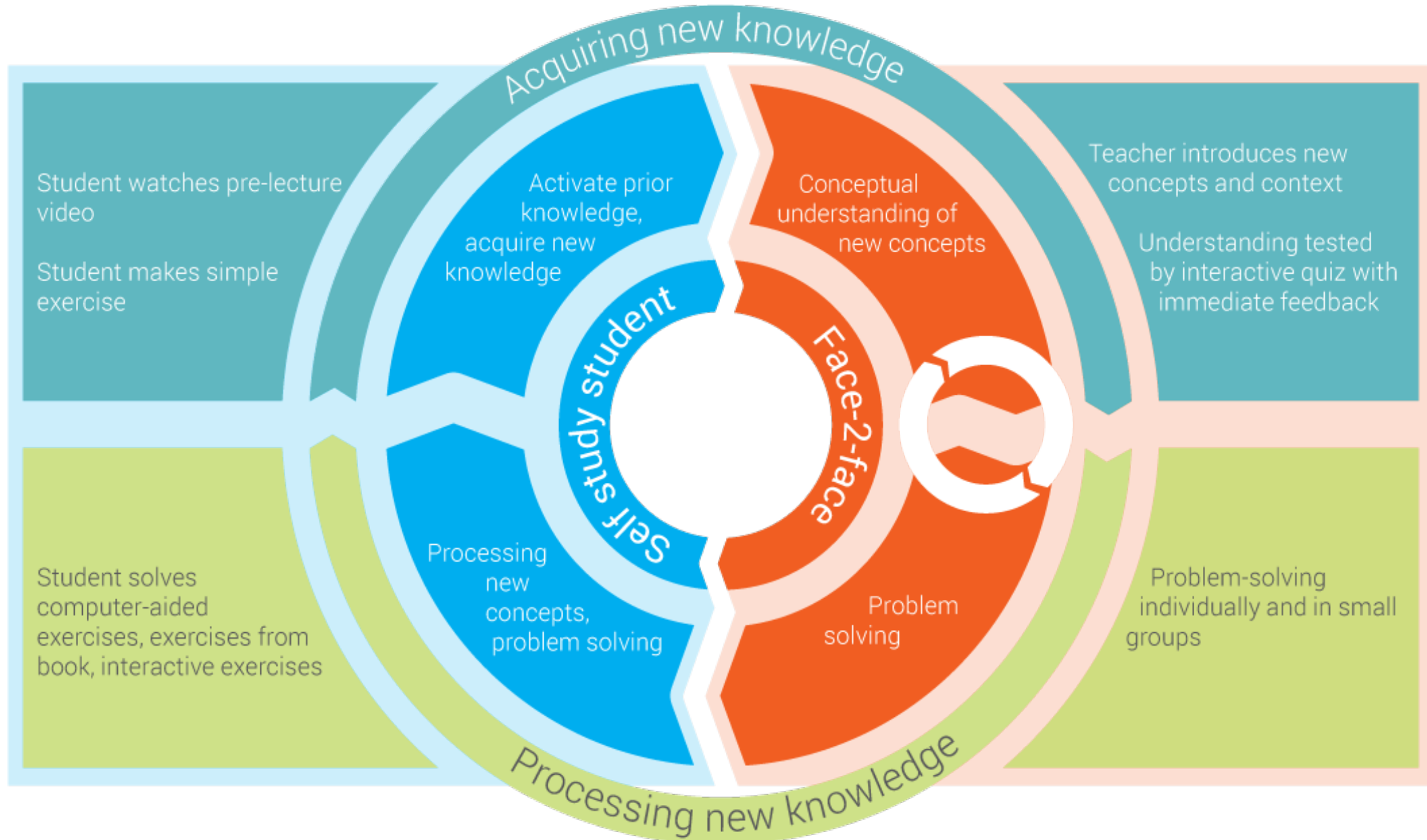
Real-world
Predictions

Test



Outcomes

PRIME-cycle: Prepare, Participate, Practice



Learning Management System (Brightspace)

Example Linear Algebra course

This lecture

Overview

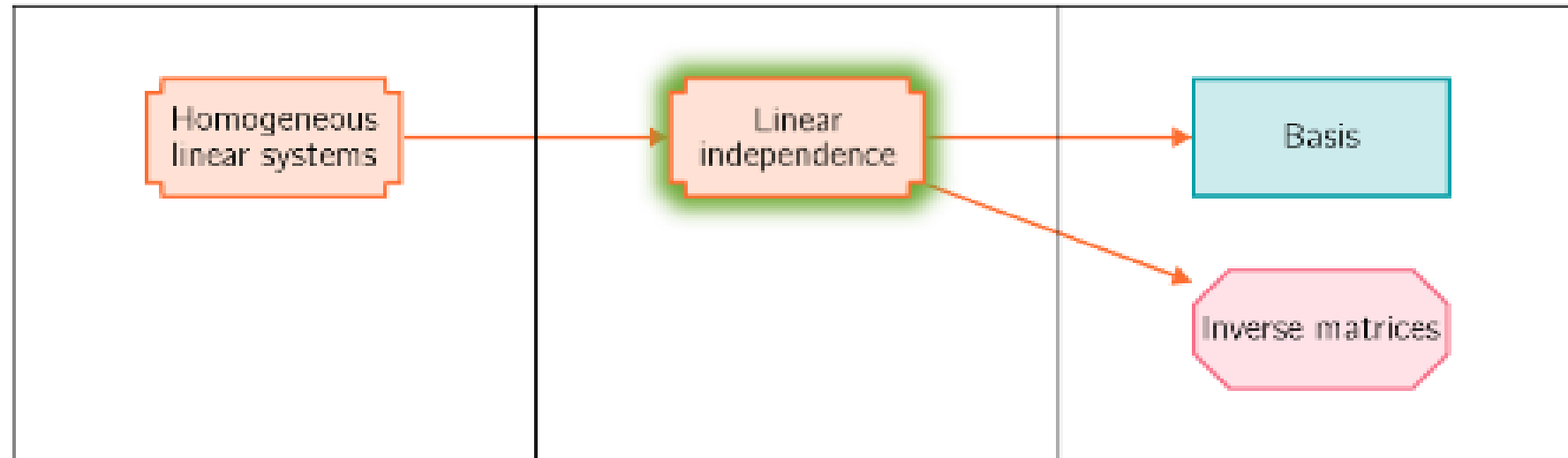
Domains



Previous topics

This lecture

Next topics

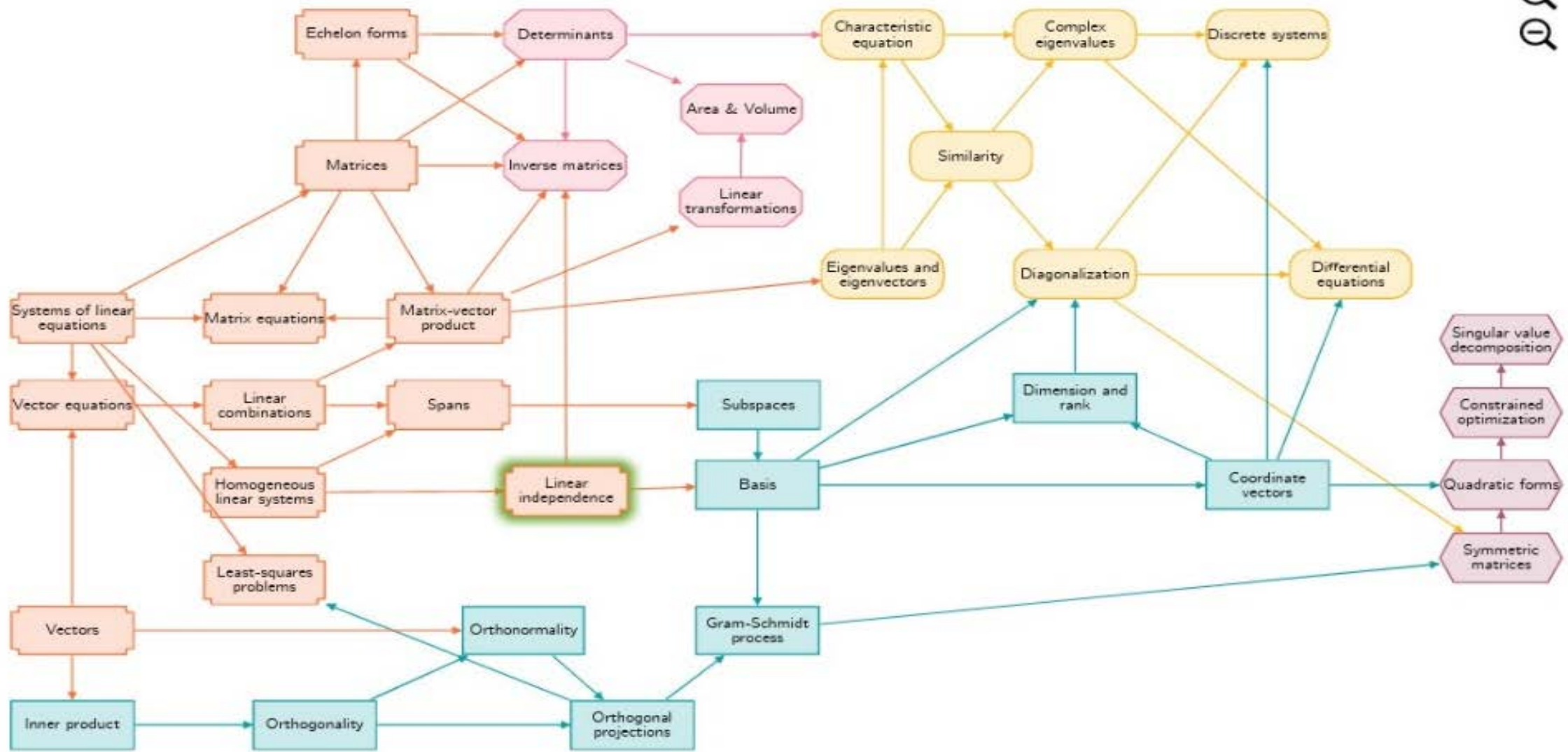
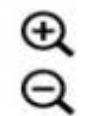


Learning Management System (Brightspace)

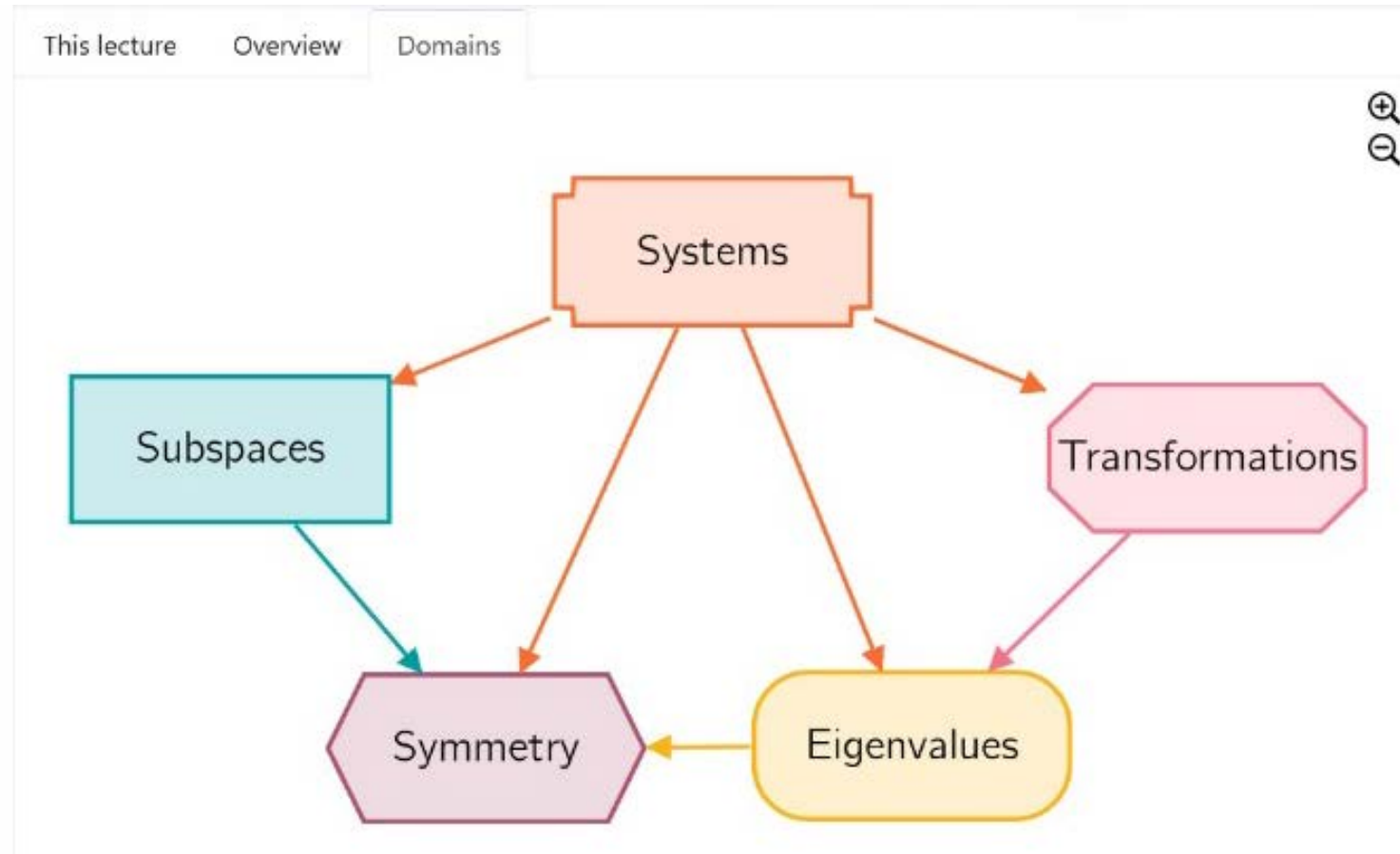
This lecture

Overview

Domains



Learning Management System (Brightspace)





OPEN EDUCATIONAL
RESOURCES

Educational material

- 250+ pre-lecture videos*
- Slide-packs
- 2000+ exercises on GraspLe** Homework → Exams
- Context videos***
- Applets & interactive videos***
- Academic reasoning lessons for Linear Algebra

* See <https://www.tudelft.nl/en/eemcs/study/online-education/math-explained/>

** See [GraspLe.com](https://www.grasples.com/)

*** See [PRIME website](https://www.prime.nl/)

Effects

Students

- Clear structure
- Feedback
- Support self-regulated learning

Efficiency

- Less preparation time for teachers
- More time for feedback during class
- Uniformity among lecturers
- Use and reuse of material

Lecturers

Training and development

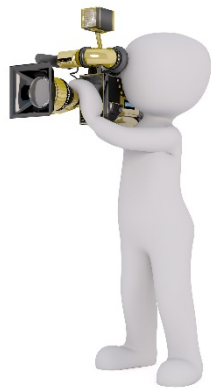
- How to teach
- How to develop the ideal polling question
- How to activate students



Lecturers

Training and development

- How to teach
- How to develop the ideal polling question
- How to activate students



Dialogues on

- How do we teach
- What do we teach
- Who do we teach



Success factors

Team effort!

Success factors

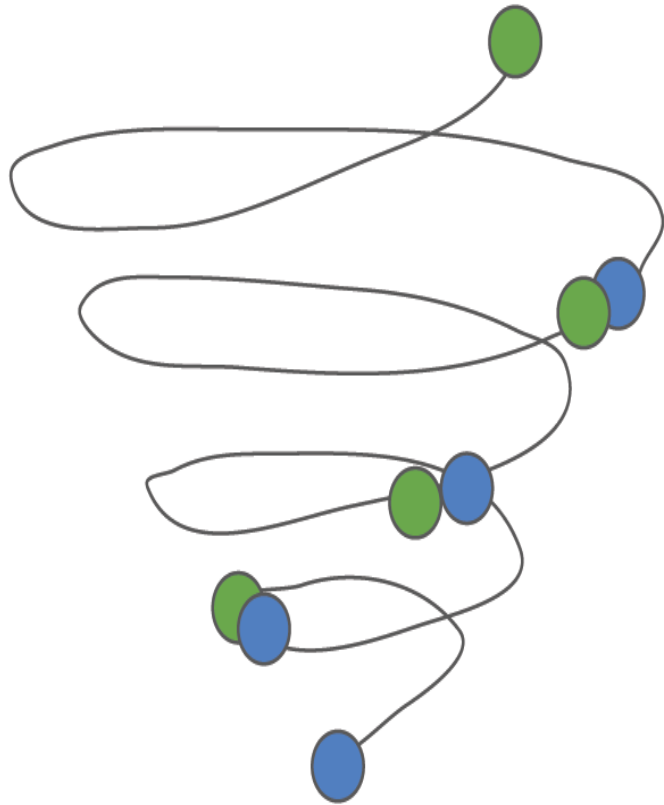
Team effort!

- allocate time to lecturers
- involve students
- educational advisors
- research
- ICT innovation
- strong steering committee

Research

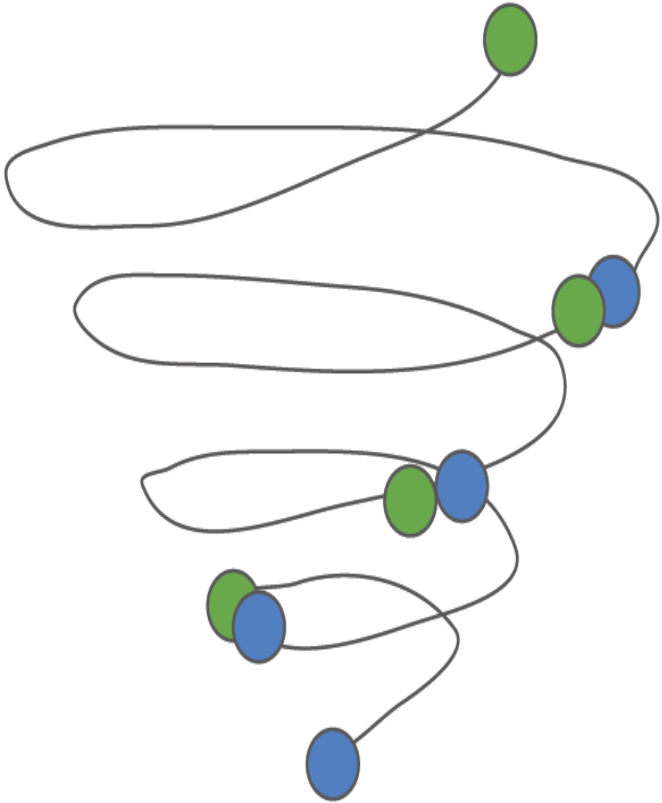
Education vs Research

Research

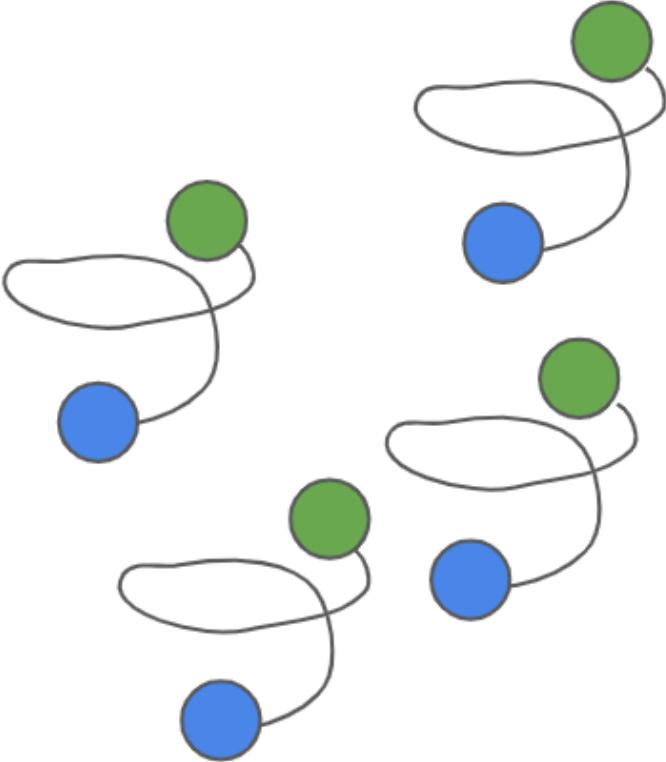


Education vs Research

Research

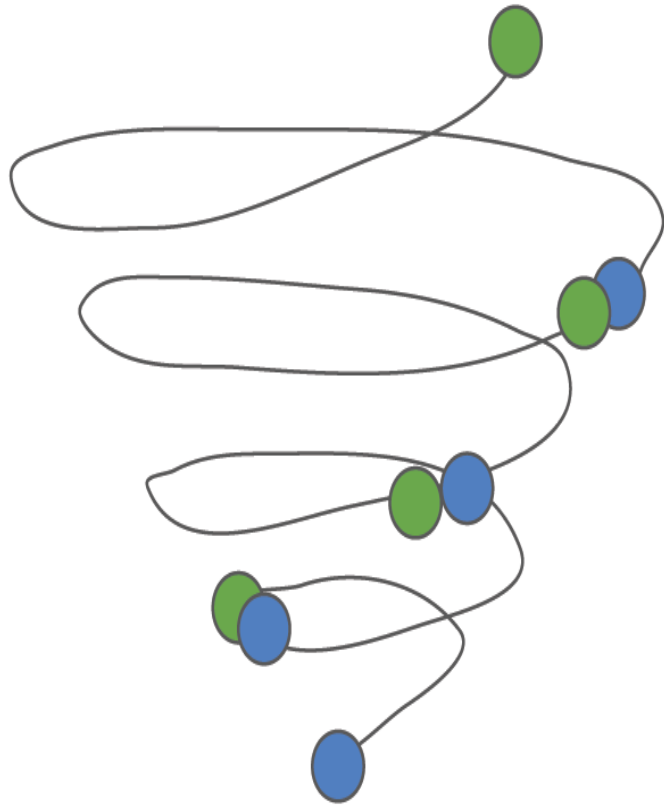


Education

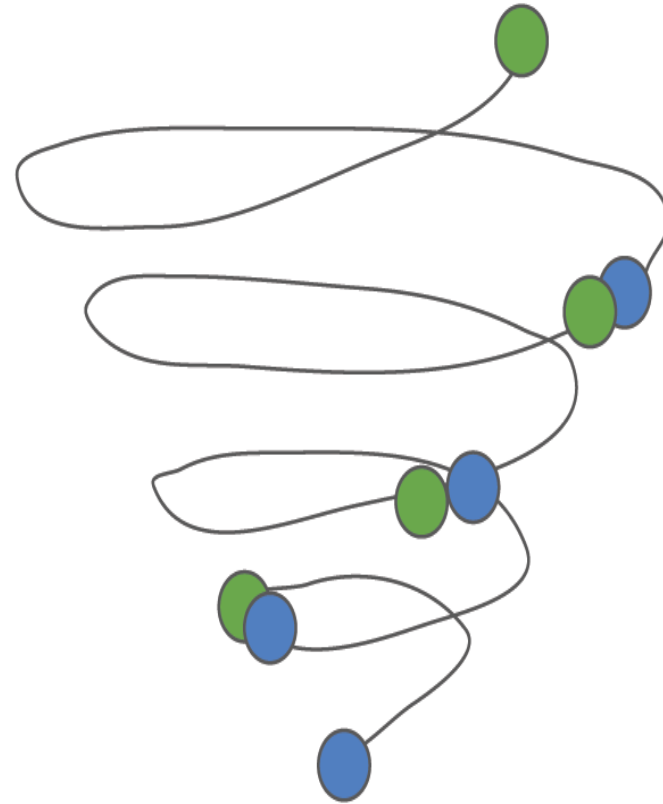


Vision: Education supported by educational Research

Research

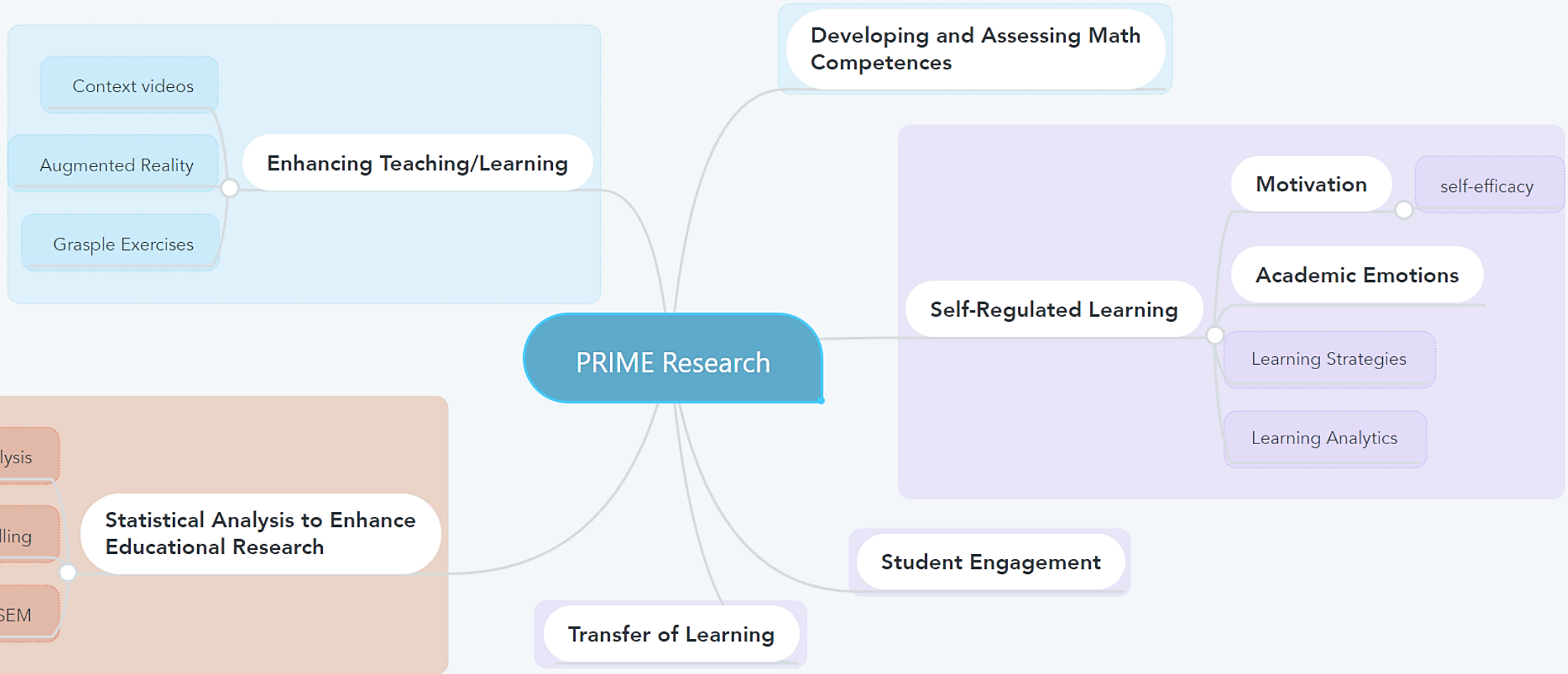


Education



Research team

- Jacqueline Wong (postdoc)
- Nathalie van der Wal (postdoc)
- Laura Mensschaart (PhD student)
- Elli Papageorgiou (PhD student)
- Renate Klaassen (PI)





Questions?