UNIVERSITY OF TWENTE.

CLOSING THE GAP BETWEEN SCHOLARSHIP AND PRACTICE

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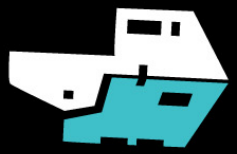


THE EXISTENCE OF A GAP

LINEAR ALGEBRA AS AN EXAMPLE

A great deal of research has been carried out on the teaching and learning of subspaces, linear independence, basis, span – concepts students struggle to understand.

No clear route for that research to influence classroom practice.

CHALLENGE-BASED LEARNING

The vision is inspiring.

Implementation is daunting at best.

Certainly context-dependent.

What about the context of mathematics?

PROPOSED COURSE

THE STUDENT EXPERIENCE

Students will

- choose an educational challenge,
- consult with the stakeholder (maths lecturer),
- carry out a literature review,
- take part in weekly seminars,
- create a product of concrete pedagogical value
- present their work to peers and maths lecturers

PROPOSED COURSE

EXAMPLES OF CHALLENGES

- Span, basis, linear independence and subspaces are concepts students struggle to grasp. How can we support development of conceptual understanding?
- Mathematical modelling is very hard to teach, yet is very important for applied mathematicians. Are there frameworks for successful teaching of modelling? Or replicable examples of good practice?
- Oral assessment can be very effective, but difficult to scale up. What advice can the literature offer us?

PROPOSED COURSE

POTENTIAL PRODUCTS

- A worksheet of exercises empirically shown to improve conceptual understanding
- A summary of theoretical studies into how students learn a certain type of mathematics
- Theoretically grounded rubrics for assessment
- Activities to address typical misconceptions
- Examples of models of teaching certain topics
- Guidelines towards contextualising mathematics in different technical disciplines

PROPOSED COURSE

TARGET STUDENTS

- Masters or final year bachelors

- Students in the teacher training programme
- Bachelor students taking the educational minor (Leren Lesgeven)
- Mathematics teaching assistants

- Open to all

IN CLOSING

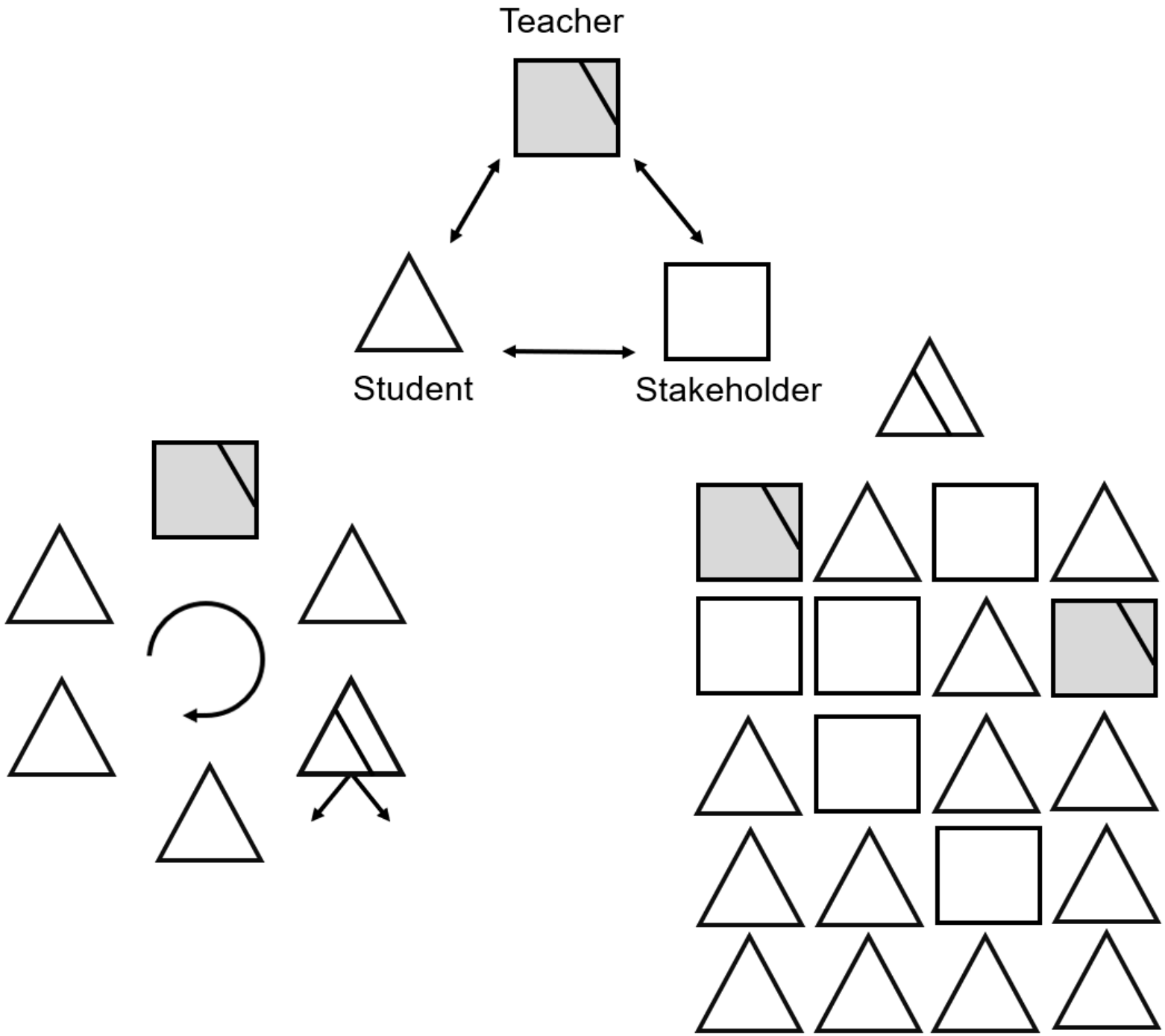
Our proposed course aims to extract the findings in mathematics education research to place evidence-informed teaching tools directly into the hands of lecturers, the real-world stakeholders.

Students will apply educational theory to a challenge in mathematics education to create an interdisciplinary product of practical value.

AVAILABLE LITERATURE

EXAMPLE: LINEAR ALGEBRA

- Steward, S., Andrews-Larson, C., Zandieh, M. (2019). Research on teaching and learning in linear algebra [Special issue]. *ZDM*, 51(7).
- Hausberger, T., Zandieh, M., & Fleischmann, Y. (2021). Abstract and Linear Algebra. In *Research and Development in University Mathematics Education* (pp. 147-168). Routledge.
- Turgut, M., Smith, J. L., & Andrews-Larson, C. (2022). Symbolizing lines and planes as linear combinations in a dynamic geometry environment. *The Journal of Mathematical Behavior*, 66, 100948.
- Cook, E. (2022). Stop-motion LEGO® animations for learning linear algebra. *International Journal of Mathematical Education in Science and Technology*, 53(3), 594-602.


Teacher
Student
Stakeholder