VIDEOS AS A PEDAGOGIC TOOL IN MATHEMATICS TEACHING

TECHNIQUE, ADVANTAGES AND CHALLENGES

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mälardalen university 2025-01-15

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INTRODUCTION

joint project at KTH between the department of mathematics and the department of learning in STEM to produce **short videos** explaining mathematics on the **learning glass**

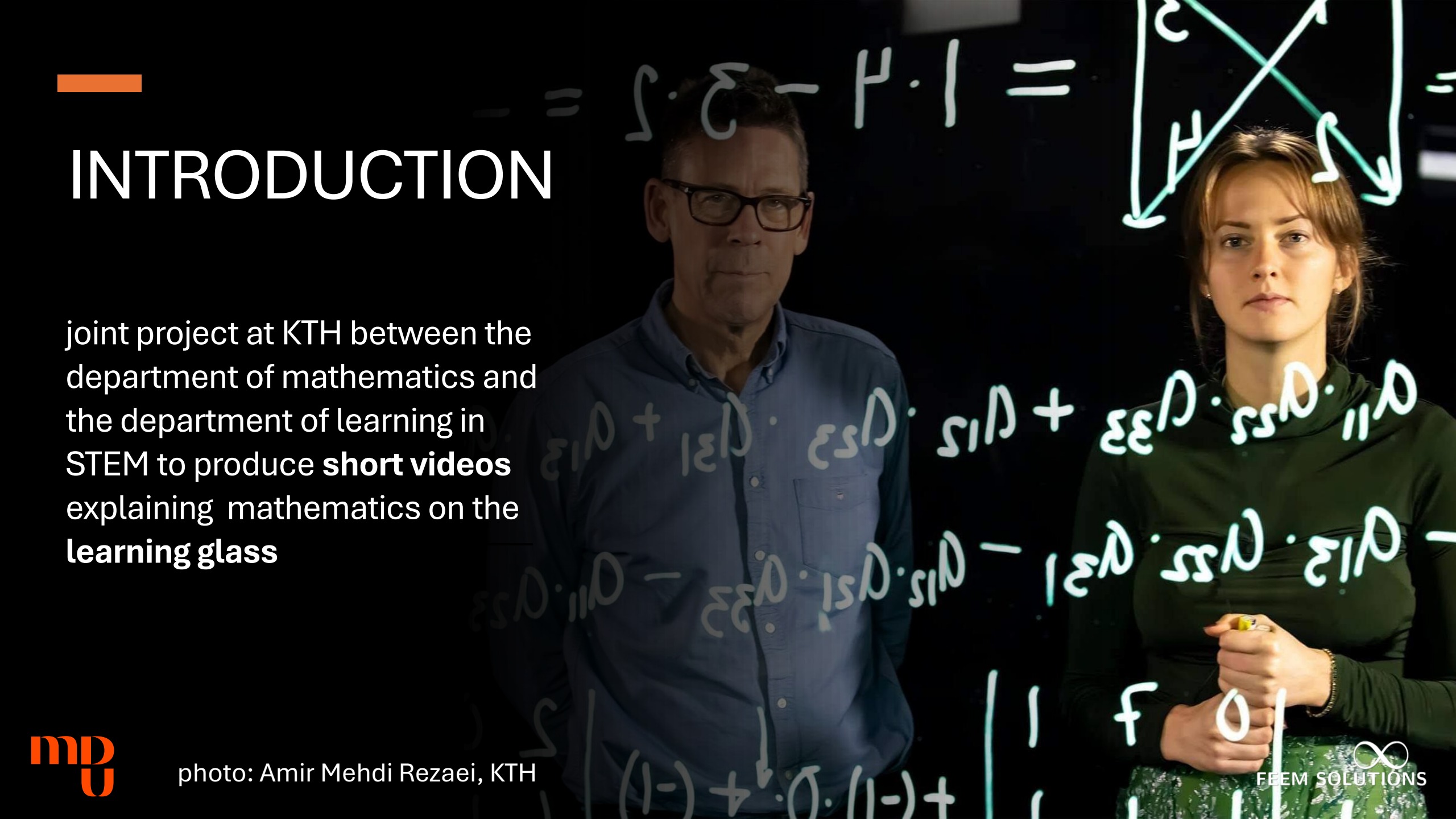

photo: Amir Mehdi Rezaei, KTH

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AGENDA

short presentation about myself and FEEM Solutions

PART 1 – MATHEMATICS VIDEO PROJECT AT KTH

- background
- learning glas

what is your experience with pre-recorded videos in teaching?

PART 2 – ADVANTAGES AND CHALLENGES WITH PRE-RECORDED VIDEOS IN MATHEMATICS EDUCATION

- comments from teachers at top technical universities in Sweden
- discussion and summary

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ABOUT ME

PART 1 – LEARNING GLASS VIDEO PROJECT

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BACKGROUND

videos as one of several tools in a flipped classroom technique appear to be beneficial for student motivation, conceptual learning and exam results

1. Cronhjort, M., Filipsson, Lars. Weurlander, M., Improved engagement and learning in flipped-classroom technique, 2018.
2. Cronhjort, M., Filipsson, Lars. Weurlander, M., Can peer instruction in calculus improve student learning?, 2013.

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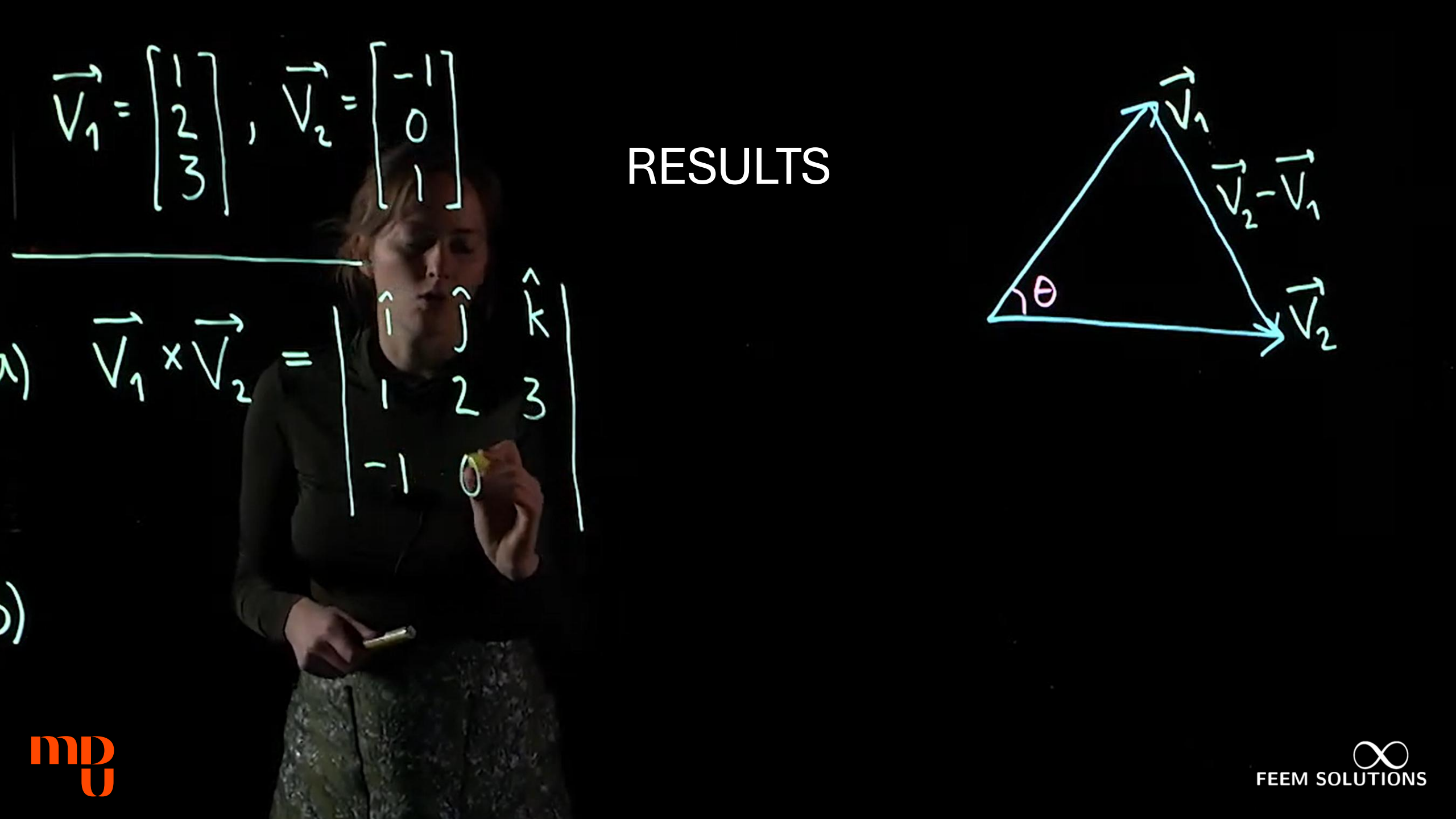
RESULTS



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VIDEOS AS A TOOL IN MATHS EDUCATION

Information

Kursplan	Innehåll	Litteratur	Schema	Seminarium	Tenta	FAQ

Planering

Vecka/ modul	Föreläsning 1	Föreläsning 2	Föreläsning 3	Övning 1	Övning 2	Seminarium	Länkar (video)
1	Linjära ekvationssystem, vektorer, linjer och plan, (1.1-1.3, 2.1) f1.pdf	Skalärprodukt, vektorprodukt (1.1-1.3, 4.3) f2.pdf	Parameter- och normalform, lösningsmängder (1.3, 2.1, 3.5) f3.pdf	101129#2, 111014#3, 1.3.33	2.1.16, 2.1.13, 2.1.19	• Linjer och plan • Parameter- och normalform	• Linjära ekvationssystem • Skalärprodukt • Kryssprodukt
2	Matriser (3.1-3.2) f4.pdf	Gausselimination (2.2) f5.pdf	Inversa matriser (3.2-3.3) f6.pdf	110912#1, 3.1.16, 3.1.23	3.2.9, 3.3.16, 3.3.23	• Lösning av linjära ekvationssystem • Trappstegsform • Lösningsmängder	• Matriser • Gausselimination • Gauss-Jordanelimination • Inversa matriser
3	Linjärkombination, linjärt hölje (3.4-3.5) f7.pdf	Linjärt oberoende, delrum i R^n (3.4-3.5) f8.pdf	Determinant (4.1-4.3) f9.pdf	3.4.14, 3.5.1, 3.5.8, 120206#1	110923#2, 4.2.30, 4.2.25	• Determinant • Linjärt oberoende • Lösningsmängder	• Linjärt oberoende • Determinant • Kryssprodukt

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TECHNIQUE

videos recorded during 2019-2020 at KTH on a home built **learning glass**

strong collaborataion with the **department of digital learning** for media production

size, lighting, improvements, ...

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PART 2 – ADVANTAGES AND CHALLENGES

SELECTED COMMENTS

“Very useful for efficient teaching, one can reuse the material many times. Does not replace student-teacher interaction! Students may skip class if they think so.”

“It is very good as a complement to the lectures but cannot replace in person lectures.”

”Time consuming.”

Source: Anonymous comments from faculty at the mathematics departments, KTH and Chalmers, January 2025.

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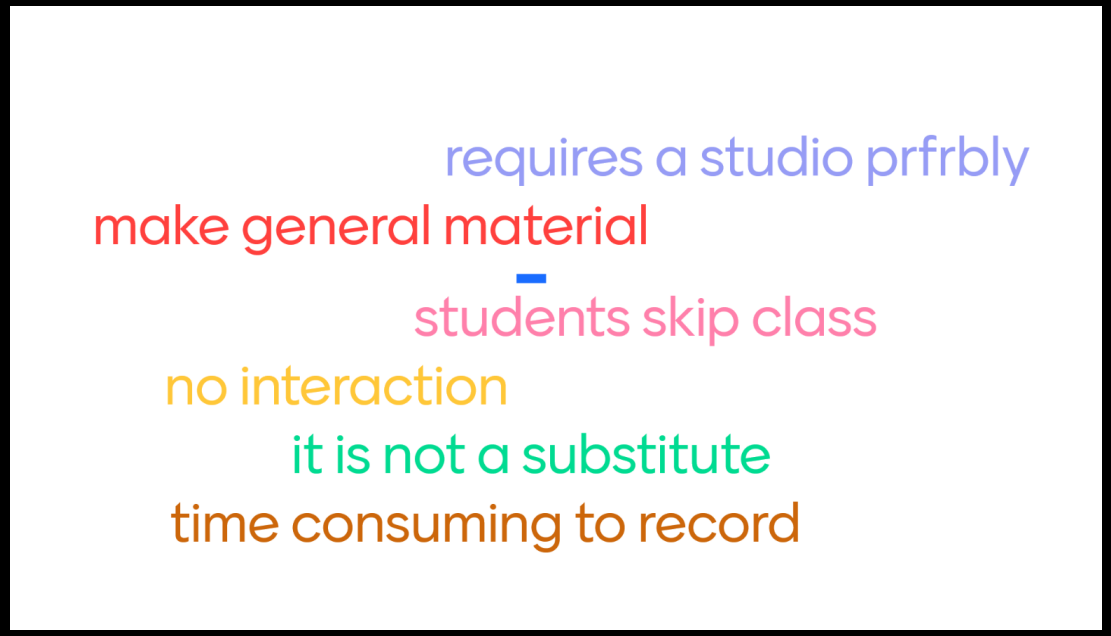
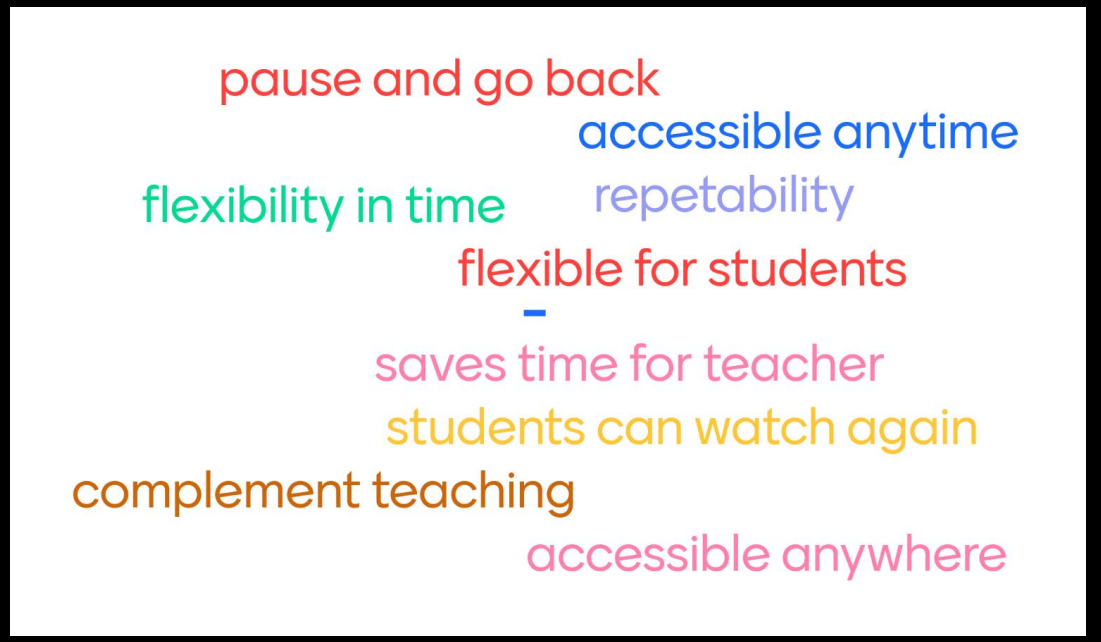
SELECTED COMMENTS

challenges



advantages



Source: Anonymous comments from faculty at the mathematics departments, KTH and Chalmers, January 14 2025.

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CASE STUDY

”Linus”, 21, first year engineering student at KTH

students skip class
no interaction
it is not a substitute

pause and go back
accessible anytime
flexibility in time
repetability
flexible for students
–
saves time for teacher
students can watch again
complement teaching
accessible anywhere

50 h one-to-one teaching through FEEM Solutions during autumn 2024

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DISCUSSION

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IMPORTANT QUESTION

how can we optimize the usage of pre-recorded videos in maths teaching at university level?

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SUMMARY

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QUESTIONS

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THANK YOU!

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