RESHAPING MATHEMATICS EDUCATION: INSIGHTS FOR TEACHING UNDERGRADUATE ECONOMICS STUDENTS POST-PANDEMIC

Adam Thompson – Aston University

SESSION OUTLINE

- About Me

- Challenges of Teaching Mathematics

- Students Post-Pandemic

- Effective Teaching of Mathematics

- Potential Solutions

- Q&A

ABOUT ME

- Teaching Fellow in Economics at Aston University

- Over 10 years experience teaching in HE

- Teaching *"Mathematics for Economics"* module for 3 years

- Historical personal struggles with mathematics

Go to **vevox.app**

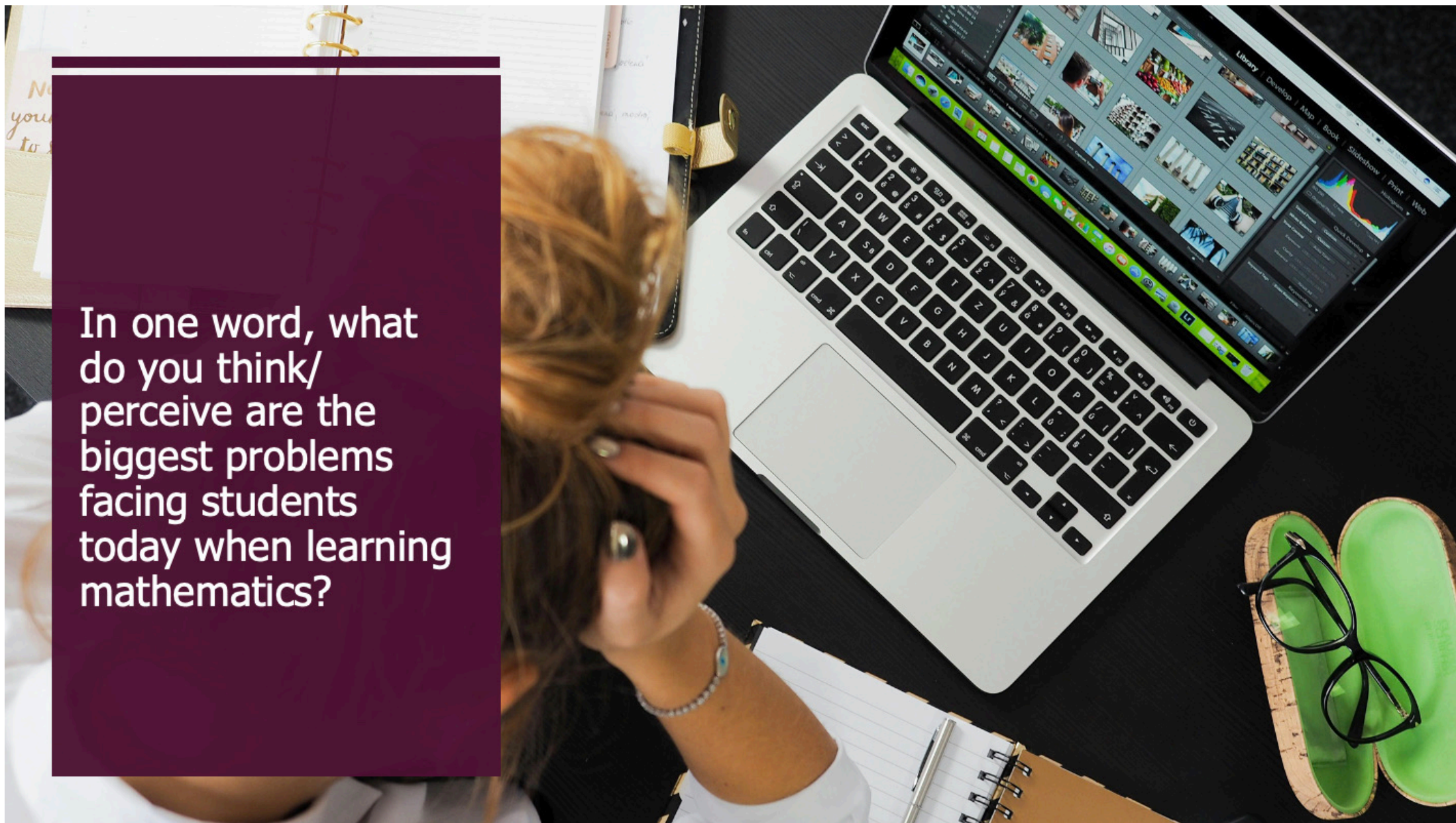Enter the session ID: **195-907-665**

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In one word, what do you think/ perceive are the biggest problems facing students today when learning mathematics?

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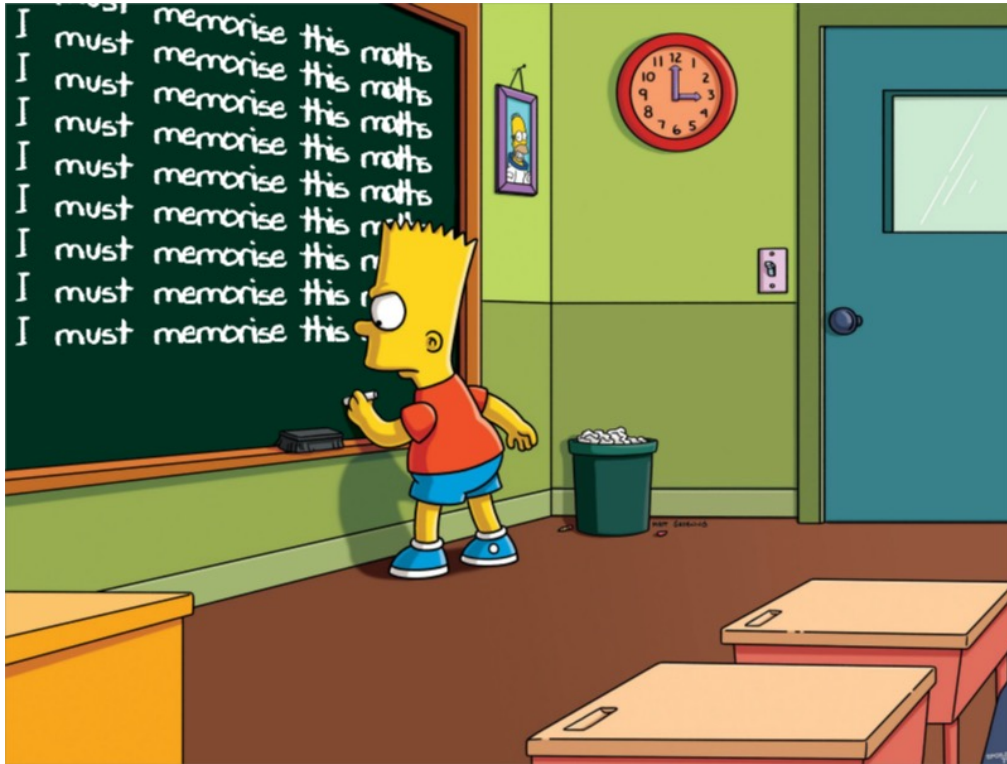
RESULTS SLIDE

CHALLENGES OF TEACHING MATHS

1.) Maths Anxiety

- Fear of failing

- Don't have the *"maths gene"*

- Fear and Anxiety combined - vicious circle (Dowker et al., 2016)

- A-Level Maths pre-requisite
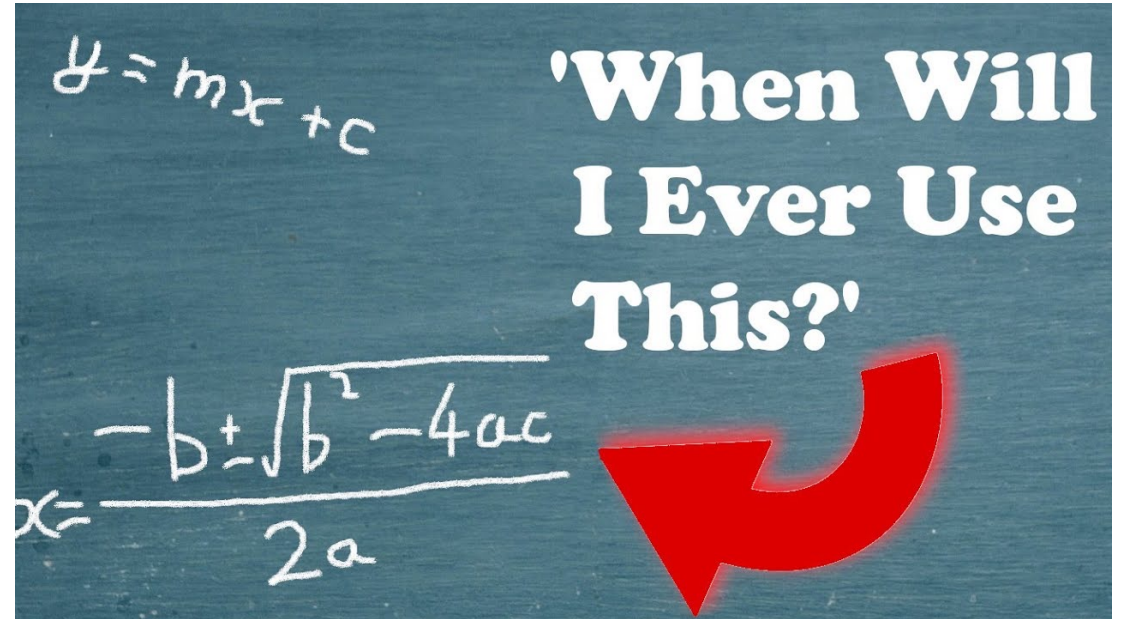
CHALLENGES OF TEACHING MATHS

2.) Conceptual Understanding vs. Memorisation

- Procedural nature - highly susceptible to memorisation
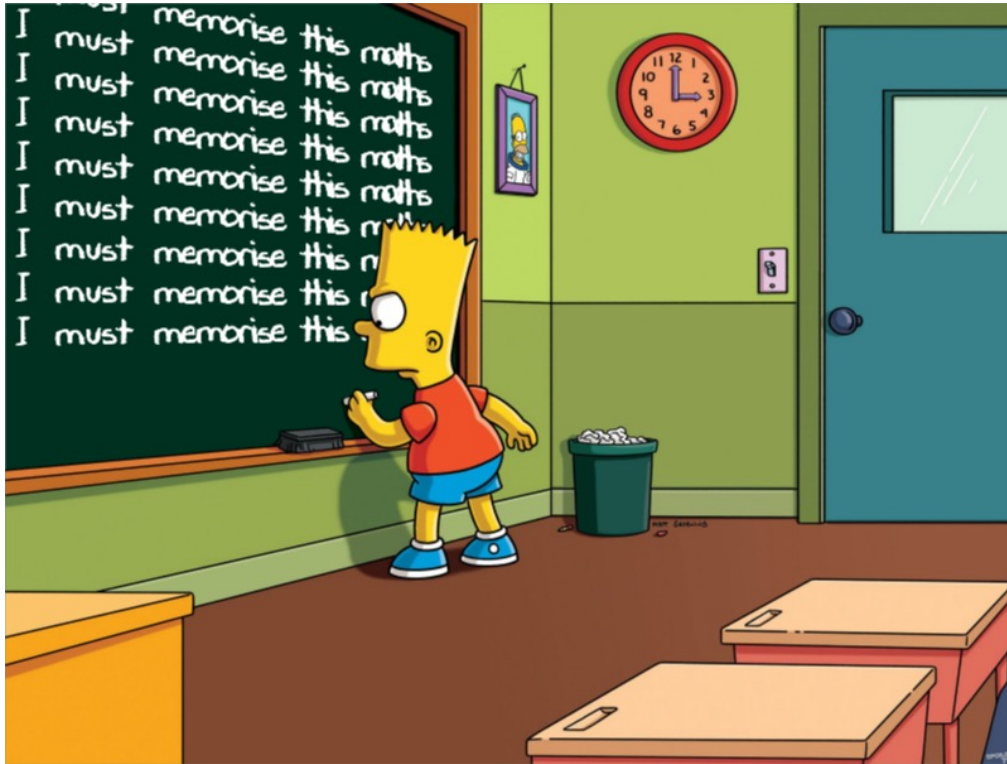
- Previous success with memorisation

CHALLENGES OF TEACHING MATHS

3.) Perception of Relevance

- *"Why is the maths I am learning important?"*

- *"When will I ever use this in real life?"*

CHALLENGES OF TEACHING MATHS

4.) Engagement

- Erosion of Focus

- Competition for students' attention is high!

- Smartphones/Devices – constant stimulation

- Social media and instant gratification

STUDENTS POST-PANDEMIC

Worsened Mental Health

- *"74% of students reported that Covid-19 has had a negative impact on their mental health and wellbeing at university"* (studentminds.org.uk)

- Increased 'fatigue' amongst students to proactively engage with enrichment activities that are traditionally linked to university life (Quality Assurance Agency)

STUDENTS POST-PANDEMIC


Loneliness/Social Disconnectedness

- "Two thirds of respondents say they have often felt isolated or lonely since March 2020" (studentminds.org.uk)

- Struggle to forge new social connections (Burns et al., 2020)

- Leading to increased stress, anxiety, and depression (Richardson et al., 2017)

STUDENTS POST-PANDEMIC

Lower Attendance

- Consequence of reduced mental health and social disconnectedness?

- Exponential fall in attendance

- However, other factors could also be contributing (personal finances, etc.)
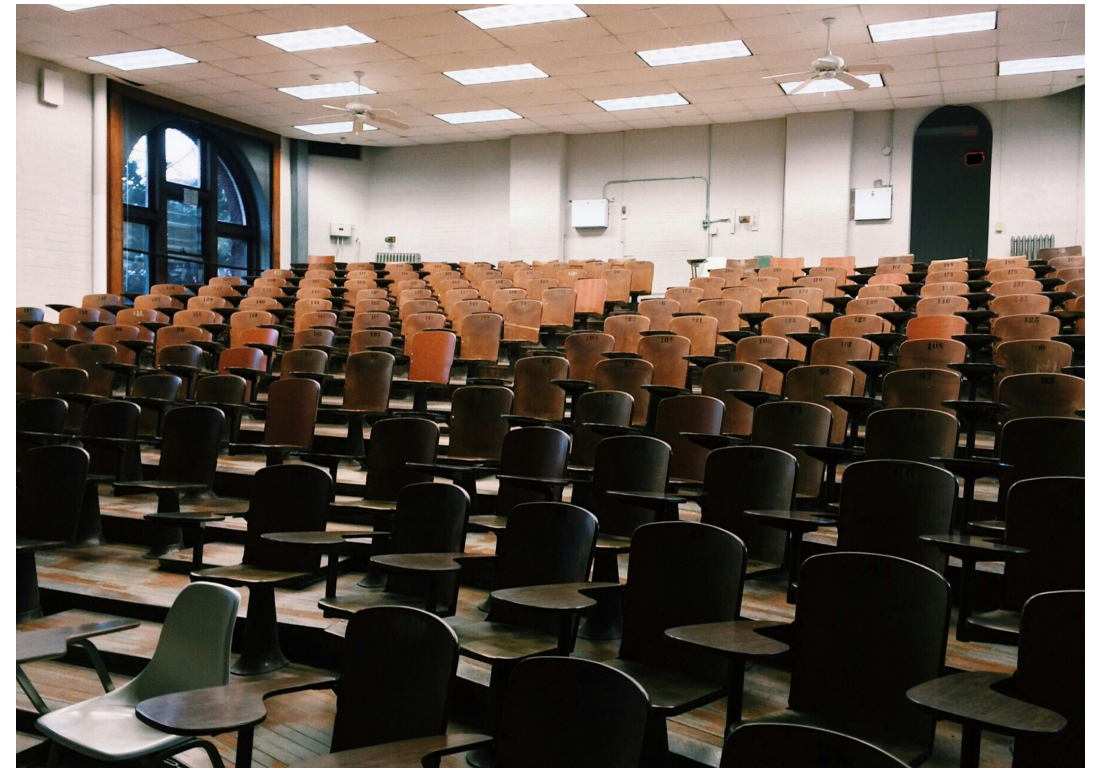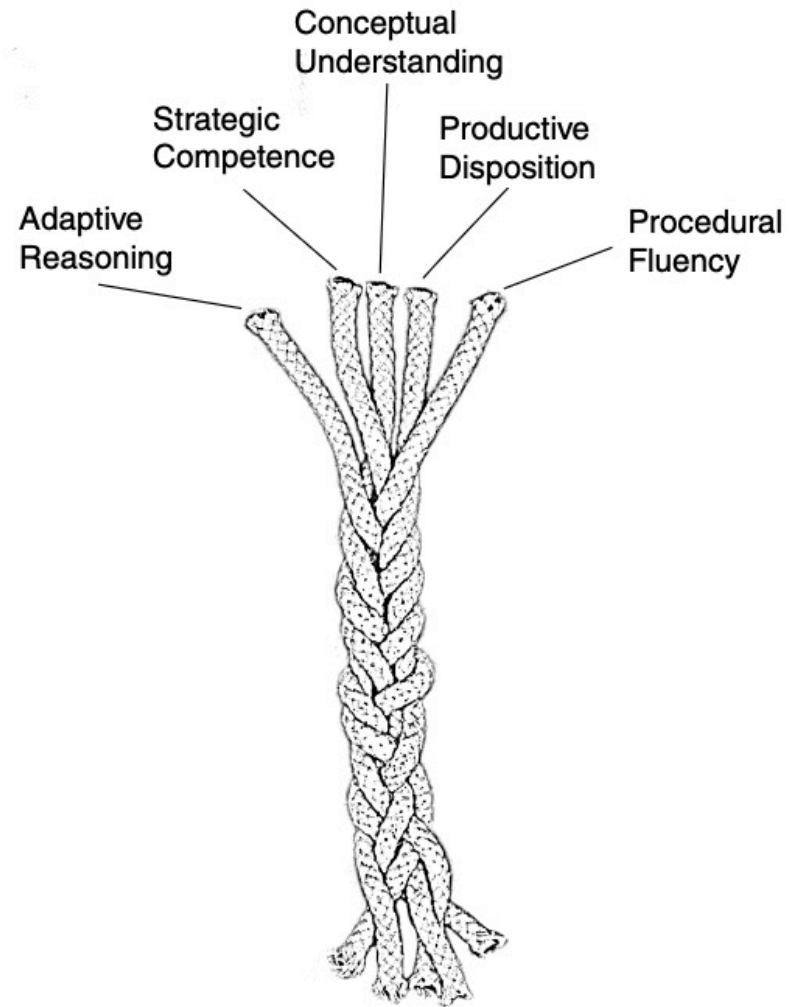
Mathematical Proficiency Framework

(Kilpatrick et al. (2001))

MAPPING THE ISSUES
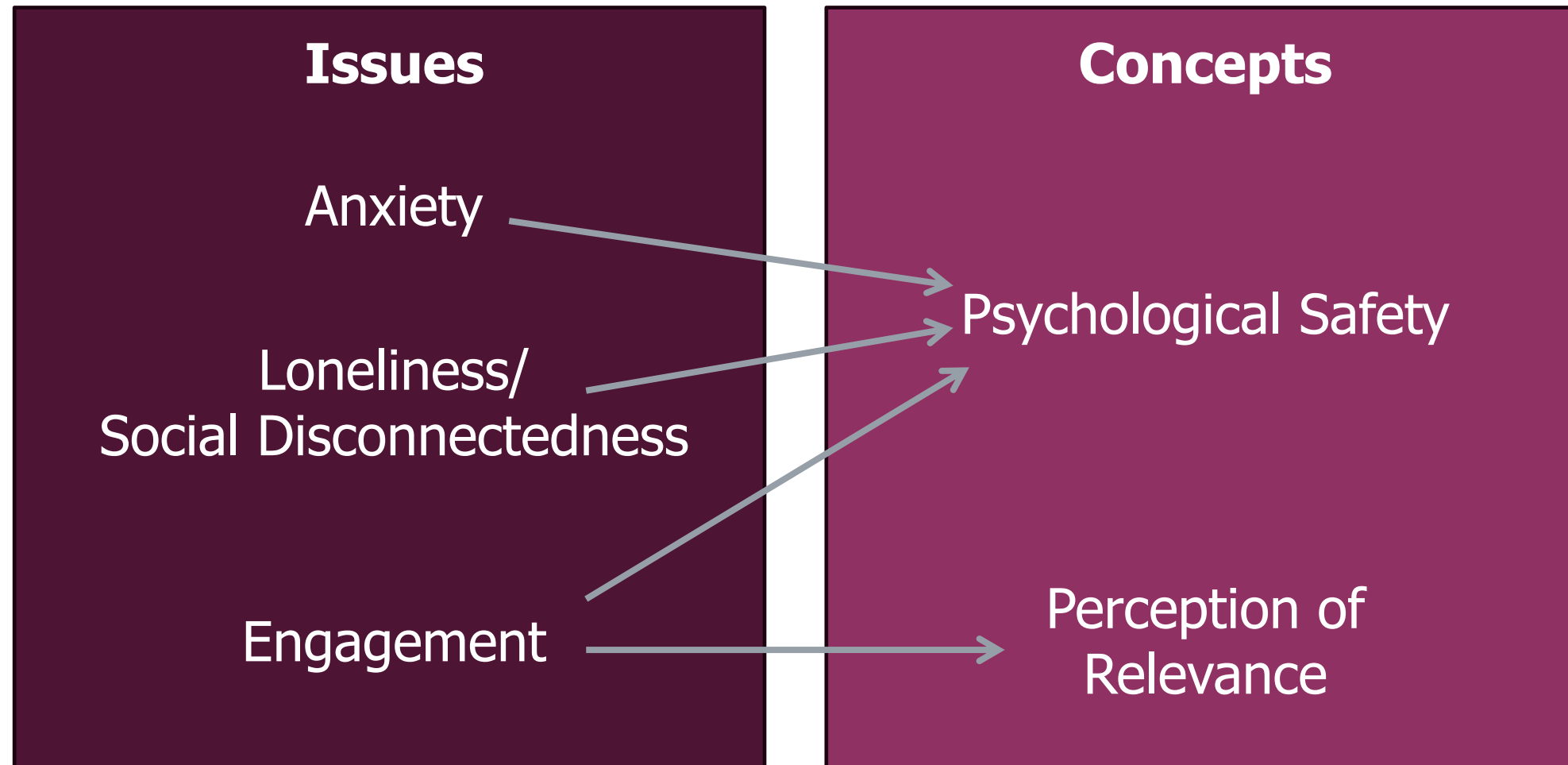
How can we improve psychological safety for students?

RESULTS SLIDE

STRATEGY – PEER ASSISTED LEARNING (PAL)

- Student-led feedback sessions (No tutor present)

- 1-hour optional session (weekly)

- Topic-oriented

STRATEGY - MODULE ALIGNMENT

- Taking a "course-based" approach to a new level

- Co-ordinating week-by-week

- *"The budget constraints you have looked at with Jon are examples of linear functions"*

- *"In microeconomics you have been looking at consumer theory, we can use the Lagrange multiplier to find tangency point between the budget constraint and the outer most indifference curve"*

- Increased salience → higher engagement

STRATEGY - RELATABLE EXAMPLES (EXAMPLE 1)

A firm's production function is given by:

$$Q = KL$$

Unit capital (K) and labour (L) costs are £2 and £1 respectively. The total cost for the firm has to be £50

Using the Lagrange multiplier method, find the number of units of labour and capital the firm needs to employ to maximise production subject to their cost constraint.

STRATEGY - RELATABLE EXAMPLES (EXAMPLE 2)

You and your friends have decided to have a movie night. You are stood in the shop deciding how much popcorn (X_1) and how much chocolate (X_2) you should buy.

Your utility function is given by:

$$U = X_1 X_2 + 2X_1 + 2X_2$$

Assuming you have £10 to spend on snacks, popcorn (X_1) costs £1 a pack, and chocolate (X_2) costs £2 per pack, how many of each should you buy to maximise your utility?

CONTINUOUS ASSESSMENT

- "Stick" or "Carrot"?

- 25% of module mark (best 4 from 6 scores)

- Pearson MyLab

- Mixture of quizzes and tests

This quiz: 6 pts possible
This question: 1 pts possible

⚙

Submit quiz

Question list ⟻

- ◯ Question 1
- ◯ Question 2
- ◯ Question 3
- ◯ Question 4
- ◯ Question 5
- ◯ Question 6

Solve the quadratic equation

$$5x^2 = 720$$

⋯

$x = \boxed{}$ (Simplify your answer. Use a comma to separate answers as needed.)

Help me solve this | **View an example** | ☐ **Show completed problem** | (Check answer) | **Next**

MYLAB QUIZ

MYLAB QUIZ EXAMPLE

Quiz: **Chapter 2: Wh...**

Submit quiz

Question list

- ○ Question 1
- ○ Question 2
- ○ Question 3
- ○ Question 4
- ○ Question 5
- ○ Question 6

View an example | All parts showing ✕

Solve the quadratic equation

$2x^2 = 98$

In order to solve this equation, we need to simplify it. The first step in simplifying this equation is to divide both sides of the equation by 2.

This gives

$x^2 = 49$ Divide both sides by 2.

Now use square roots to solve the equation.

$x^2 = 49$.

7 is the positive square root of 49.

-7 is the negative square root of 49.

Hence, the solutions of the equation are $x = 7$ and $x = -7$.

Close

Close

Help me solve this   View an example   ☐ Show completed problem   Check answer   Next

This quiz: 6 pts

Submit quiz

Question list

- Question 1
- Question 2
- Question 3
- Question 4
- Question 5
- Question 6

Help me solve this | All parts showing ✕

Solve the quadratic equation

$$4x^2 = 144$$

In order to solve this equation, we need to simplify it. The first step in simplifying this equation is to divide both sides of the equation by 4.

Simplify the equation.

$$4x^2 = 144$$
$$x^2 = 36 \quad \text{Divide both sides by 4.}$$
(Simplify your answer.)

Now use square roots to solve the equation.
$x^2 = 36$.

What is the positive square root of 36? 6

What is the negative square root of 36? −6

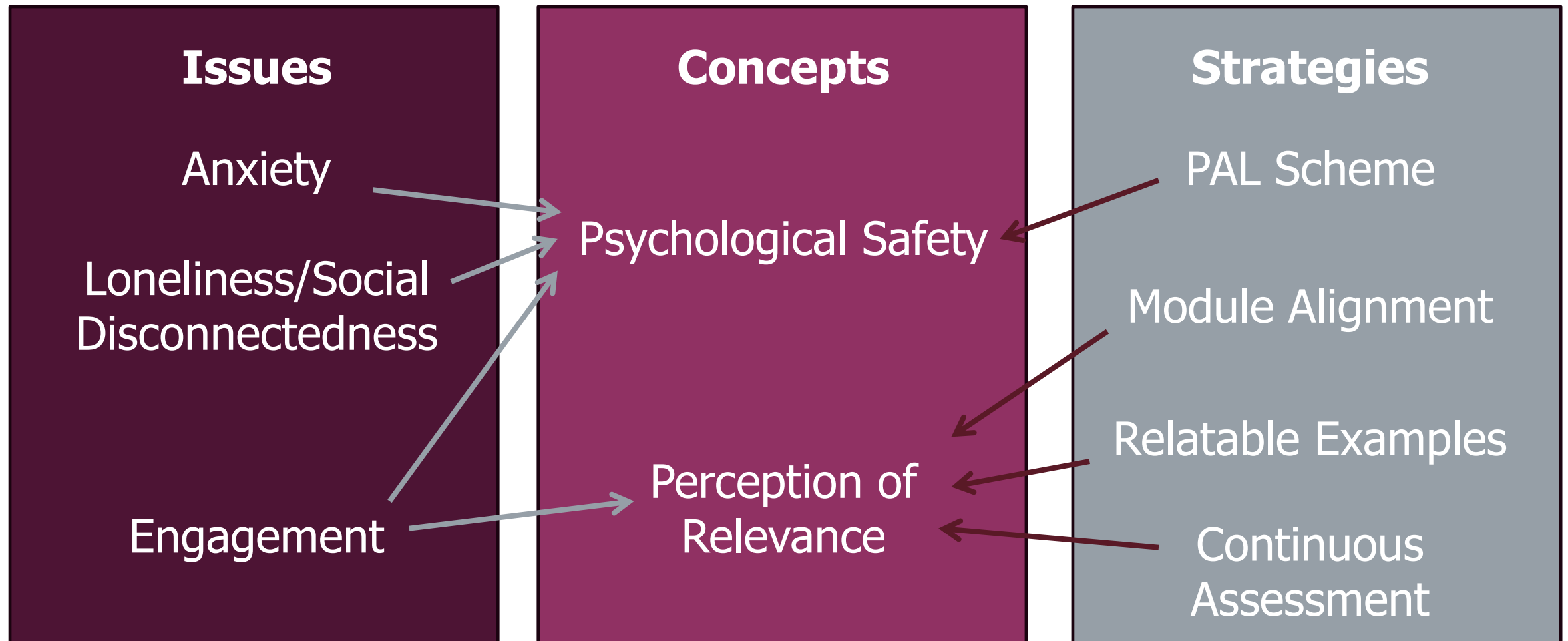Hence, the solutions of the equation are x = 6 and x = −6.

Close

More ✖

Help me solve this   View an example   ☐ Show completed problem   Check answer   Next

MYLAB

HELP

MAPPING THE ISSUES - SUMMARY

Issues

Anxiety

Loneliness/Social Disconnectedness

Engagement

Concepts

Psychological Safety

Perception of Relevance

Strategies

PAL Scheme

Module Alignment

Relatable Examples

Continuous Assessment

Students' disposition toward mathematics is a major factor in determining their educational success. Students who view their mathematical ability as fixed and test questions as measuring their ability rather than providing opportunities to learn are likely to avoid challenging problems and be easily discouraged by failure."

Kilpatrick et al., 2001, p. 132

Q & A

Thank you for listening, I would now like to welcome any questions

REFERENCES

Burns, D., Dagnall, N., and Holt, M. (2020). Assessing the impact of the covid-19 pandemic on student wellbeing at universities in the united kingdom: A conceptual analysis. In Frontiers in education, volume 5, page 582882. Frontiers Media SA.

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