



# 9th International Skills Forum Reimagining Education and Skills Development for a New Normal

23 August 2021 • 1–5 p.m. (Manila time)  
24 to 27 August 2021 • 2–6 p.m. (Manila time)

# Digital Innovations in STEM Learning & Teaching

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Womin Djeka

This means 'welcome' in the Victorian Aboriginal language  
of the Wurundjeri people.



# RMIT University

- Melbourne, Victoria, Australia
- Founded in 1887
- Australia's largest tertiary institution
- 5 campuses in Australia and Vietnam
- Programs in 12 countries





# STEM College

RMIT has three academic 'colleges'

- College of Business & Law
- College of Design & Social Context
- **STEM College**
  - School of Science
  - School of Engineering
  - School of Health & Biomedical Sciences
  - **School of Computing Technologies**



## STEM College aim

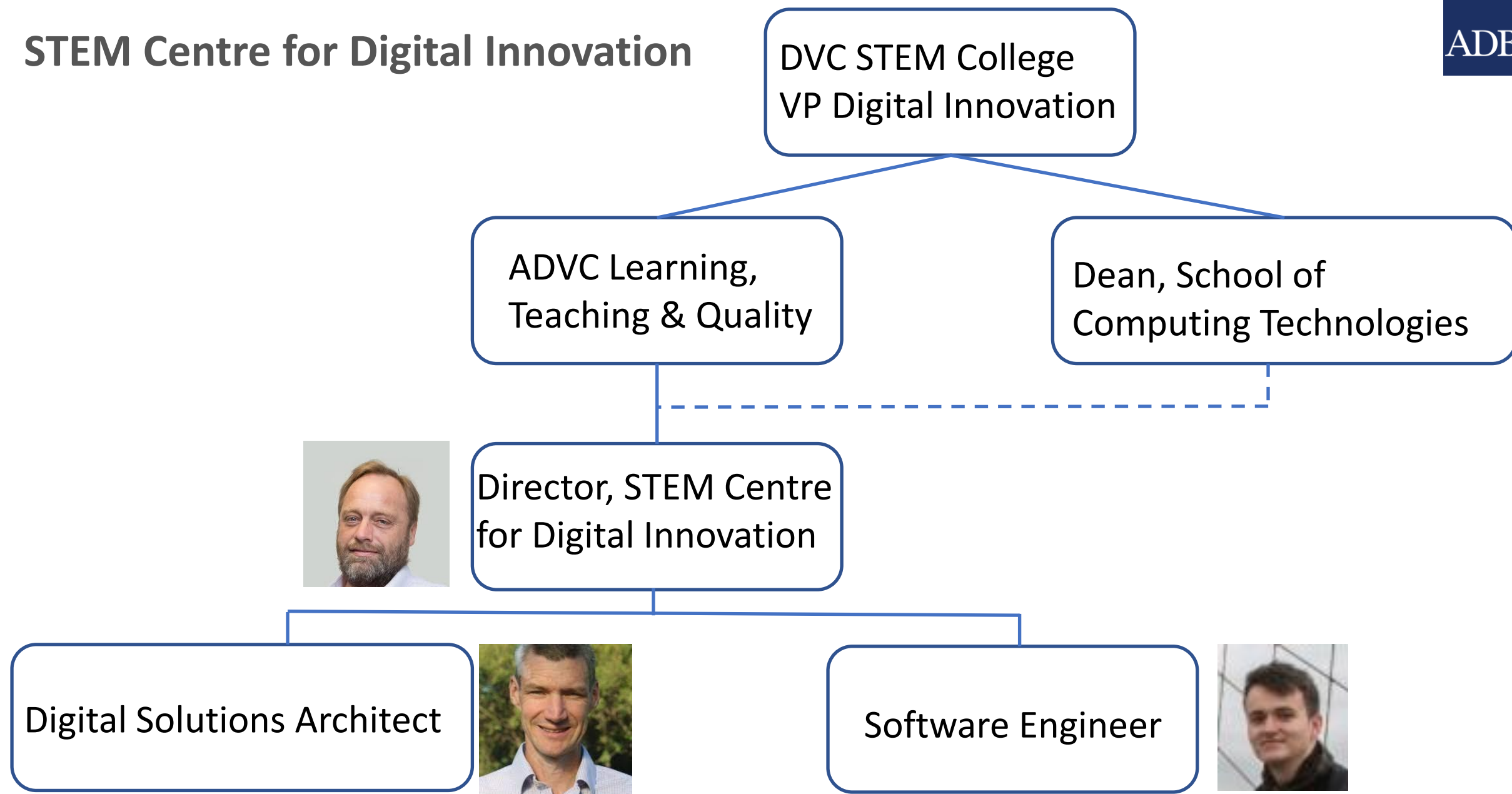
“To position the STEM College as an **innovator** and leader in STEMM education, by creating **life-changing learning experiences** for our students and developing a globally competitive workforce capable of driving industry transformations and growth in a **tech-rich world**.”

*Centre for Digital Innovation* aims to develop **world-leading practice** in **STEM teaching** through **digital innovation**

Our mission is to foster a **culture of innovation** through strategic partnerships, **research-informed leadership**, and **digital solutions** in learning and teaching in STEMM

Commenced operation in January, 2021

# STEM Centre for Digital Innovation





# Activities

- Virtualisation of lab facilities
  - Health Clinical Simulator ('HoloNurse')
  - Digital Biosciences Facility
  - Advanced Manufacturing Precinct
  - ...
- Augmented Reality textbooks & exercises
- Socratic AI chatbot ('Socky')
- Intelligent Assessment
- Accessibility via Technology
- Lightboards
- Classroom of the Future
- Student-to-student interaction



# Health Clinical Simulator

New nurse training facility

Amplify facility use with virtual counterpart

- Preparation
- Revision
- Variation of scenarios (within parameters)

IT Student project in Semester 2, 2021





# Health Clinical Simulator

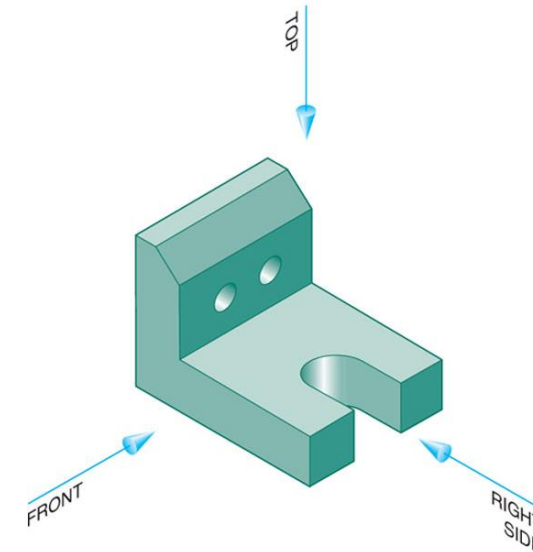
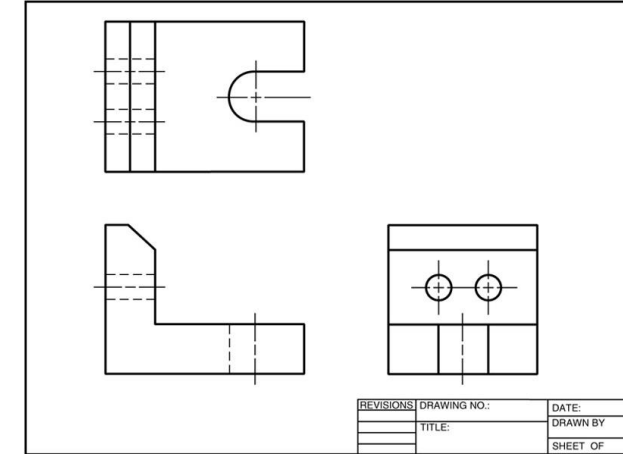
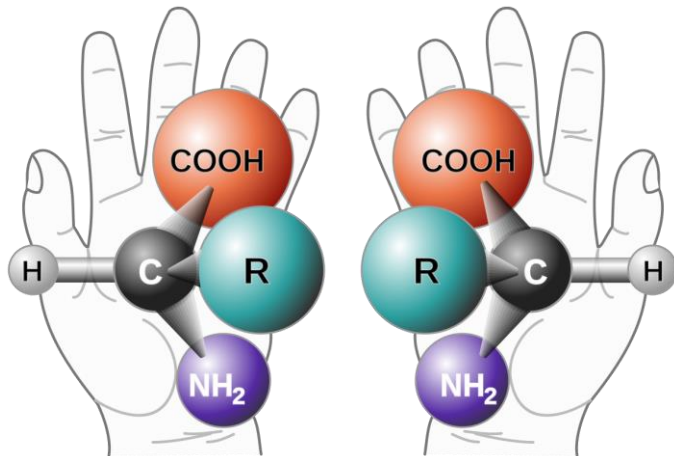
## Assessment

- Not everything should go perfectly
- Need to make this unpredictable
- Needs to be different but equivalent for each student



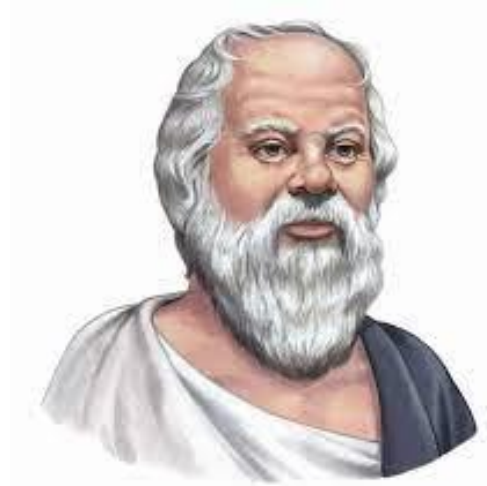
# Augmented Reality Textbooks

- Three dimensional thinking is vital in some areas
- Need to manipulate and interact with objects visually
- 2D plans vs 3D thinking
- Chemical reactions need 3D understanding
- ‘Animating’ diagrams such as beams and stresses
- 3D simulation of body implants



## Socratic AI ('Socky')

- STEM Platform courses will have 6,000+ students
- Normal discussion forums won't cut it ☹️
- Chatbots are focussed on simple queries
- Need something that
  - Answers queries ('When is the assignment due?' 'How do I apply for an extension?' 'What happens to classes on public holidays?')
  - Will prompt students ('You have three days until the next assignment is due and you haven't started')
  - Personalised ('There are three other students in a similar situation to you. Shall I contact them?')
  - Customisable (avatar, language, accent, mode of interaction, ... )





# Intelligent Assessment

- 4 College-wide courses with 6,000+ students each
- Each course will be composed of stackable modules
- Automatic grading and feedback is becoming essential
- Three aspects
  - Automatic marking of short-answer and similar questions
  - Individualised assessments (eg same process, different input numbers)
  - Machine learning for marking similar to humans
- Academic has developed Python code based on Jupyter notebooks
  - Automatic marking of questions
  - Feedback generated via HTML
- Student capstone group working on it in Semester 2, 2021 (July-November)



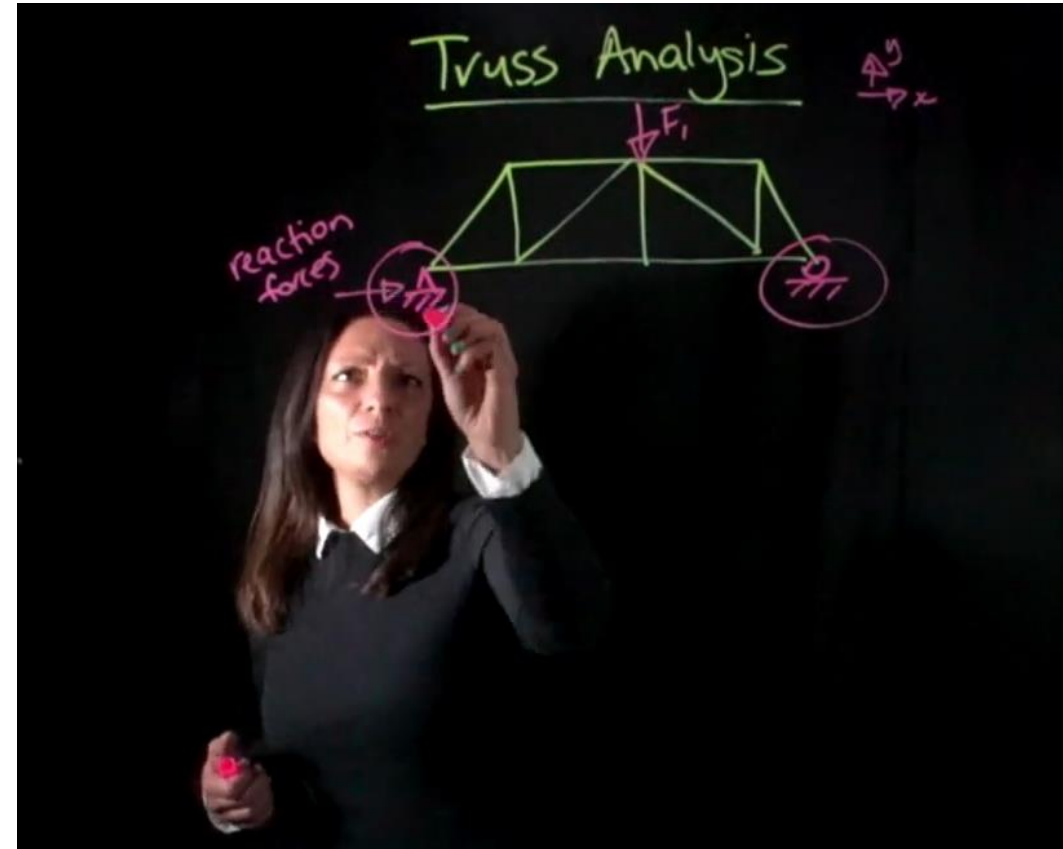
## Accessibility via Technology

- Nearly 5,000 students at RMIT registered with Equitable Learning Services
- Many such plans mention teaching materials and audio recordings (~ 1,000)
- Provide maximal access via technology
- Conversations with Microsoft about this
- Raise awareness of current technological capabilities
- Identify gaps & propose new directions
- Technological standards based on UDL
- “Choice, empowerment & personalisation”
- AR version of RMIT Blindness simulation video



## Lightboards

- Allows handwriting
- Perspective reversed by technology
- Can be recorded or streamed
- Two such kits just arrived (!)
- Integrate with AR and other technologies





# Classroom of the Future

- Tiled video wall
- Livestreamed and in-class
- Multi-model interaction
- Incorporate AR work as well
- Needs less teacher-centric design
- RMIT Barcelona & RMIT Vietnam



## Student-to-student interaction

- 4 College-wide courses with 6,000+ students each
- Each course will be composed of stackable modules
- Need to ‘connect’ students within a module
- Blended learning means diluted on-campus experience
- Based on MS Office infrastructure, particularly Teams
- “Pair up to answer the question ‘What is artificial intelligence?’ You have 10 minutes”
- Applications to student clubs and other extra-curricular activities
- ‘Anyone up for 3-on-3 on the Building 80 courts in 10 minutes?’



# Thank you!

## Questions?

