TECHNOLOGY & PEDAGOGY IN STEM ENABLING CONTEXTS

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with
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The NAEEA STEM SIG plays a crucial role in fostering collaboration, innovation and sharing good practices in enabling STEM education and research. The group promotes interdisciplinary approaches, enhances professional development and supports initiatives to improve STEM teaching and learning. Through regular meetings and presentations, the STEM SIG allows collaboration between institutions (universities and colleges) across Australia and supports the development of national scholarship and research networks in STEM education. In 2024 the group has spotlighted some technology-enhanced learning (TEL) and pedagogical approaches to help enabling educators in supporting students during their journey.

This poster delivers an overview of the utility of educational software, such as Screencastify, Padlet, Lightboard QR codes, and Notion. It also explores the integration of speech recognition software and audio files to support audition and oracy skills, which are part of disciplinary literacy.

Given the importance of educators addressing emerging GenAI influences on teaching and learning, the poster also touches on ways to broach some of the associated issues, including the cognitive and metacognitive skills educators can teach students. Where mode of delivery allows, face to face and hands on approaches to teaching are still valuable, and the usefulness of models to engage and teach students is illustrated. Finally, strategies for helping students to manage academic anxiety related to mathematics are also shared by the STEM SIG.

The poster is interactive so scan the QR codes to access online information and demonstrations to further investigate the pedagogical tools and approaches mentioned above. Also if you would like to join the NAEEA STEM SIG community, get in touch!

SIGS SPECIAL INTEREST GROUPS

NAEEA

Check out the STEM SIG Website for more information

CQUniversity AUSTRALIA

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

STEM SIG 2024 PRESENTATIONS

Kerry Bond

Listening and Oracy Skills

Using TEL for disciplinary literacy - audio files and speech recognition technology can be used in a variety of contexts to support STEM language uptake and use by students.

BENEFITS
Alternative & complementary brain regions used for learning
Comprehension contributions & oracy skill development
Increased student self-efficacy and competence in disciplinary literacy

USES
Question types include:
- Multiple-choice
- Cloze
- Mix and match

Also:
- Automated audio feedback in some question types.
- Glossary audios
- Google pronunciations
- GenAI companioning for learning and oracy feedback.
- H5P speech detection for pronunciation

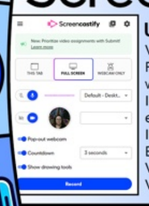
CAVEATS
May take longer for question completion, which can be a deterrent.
May feel 'different' to just reading and writing, which may be a deterrent.

Katrina Johnston & Hermina Conradie

VIDEO FEEDBACK

Easily create and share interactive video content that makes communication and learning more engaging, accessible, and personalized. This Chrome extension makes recording screen captures easy and allows the user to instantly create a shareable link and see user views.

Screencastify



USES
Video screen captures
Record entire screen, webcam or both
In-browser video editing
Interactive questions
Easy link creation
Video Library
Views captured

100% of students found the videos to be helpful to their learning (Over 60% stated Extremely Helpful)

BENEFITS
Easy to use
Easy to learn
Effective feedback
Allows cropping or more detailed editing
Saves to Google Drive
Fast link creation
Low cost
Most students prefer video to text

CAVEATS
Only free for 10 videos
Limited Free Google Drive Space

Joanne Lisciandro & Deb Monteith

Maths Anxiety

We have been trialling interventions to address math anxiety. These target:

Math Curriculum
(using real world/relevant examples; explicitly addressing student affect; explicit communication of problem solving processes; using diverse strategies to solve problems; math as a language)

Math Learning Environment
(student mentor support in the classroom; use of individual handheld whiteboards to encourage experimentation and risk taking in learning).

USES
Enabling students often need to undertake math preparatory units to be adequately prepared for undergraduate study. However, adult enabling students tend to have lower self-efficacy, negative attitudes and raised anxiety related to math learning than traditional cohorts. Interventions to address math anxiety are needed.

BENEFITS
These interventions have been trialled over the last 2 years with anecdotal success. A research project is underway to evaluate the effectiveness of these interventions.

CAVEATS
Data is not yet available.

Cinzia Loddo

ANATOMICAL MODELS IN THE BIOSCIENCES

The *Foundations of Human Biology* course of the Tertiary Pathway Program is challenging particularly for International students and students with no human biology background. For two semesters we explored *Experiential Learning* through the introduction in the tutorials of group activities that utilise anatomical models.

At the end of the semester students completed a survey.

USES
- To facilitate learning
- In particular:
  - International Students
  - Students with no prior knowledge
- To increase student's engagement
- To enhance deep understanding/learning of human anatomy and physiology
- To promote peer-to-peer interaction

90% of students said that models improved their learning

CAVEATS
Some improvements to the activities can be made as per students' feedback
The models are expensive but we managed to borrow them from the School of Medicine

90% of students said that they enjoyed using the Models

BENEFITS
Students enjoyed using anatomical models
Students felt more engaged
Models contributed substantially to their learning
Students performed better in the final exam

We were aware that students were using GenAI in their assessments but didn't know why students did or did not use Gen AI in their first assignment.

58% of students said they used GenAI to assist with assignments.

James Valentine

EXPLORING STUDENT USES OF GENAI IN ASSIGNMENTS

This project has provided valuable insights into student use, perceptions of and attitudes towards GenAI and its use in assignments,which will help shape our ongoing response to GenAI.

ChatGPT and Grammarly are the two most commonly used forms of AI.

Key Takeaways
- Wide spread use of GenAI by students
- GenAI use does not appear to have a major impact on student performance
- Some students appear to be successfully using GenAI to improve their performance
- A gap exists in students' knowledge of and experience with GenAI
- We need to better educate students on:
  - Advantages of GenAI
  - Appropriate uses of GenAI
  - Limitations of GenAI, including use of multiple GenAI tools

To Use	or	Not To Use
Common Reasons for Using GenAI		**Common Reasons for Not Using GenAI**
• Students get help for understanding the questions and correct/improve their writing • Students get help for understanding scientific terminology		• Students didn't know how to use it • The learning material provided was sufficient • Students felt they could learn more by doing the work themselves

CAVEATS
A few students used GenAI to answer questions but didn't use it to help them complete the assignment.

Shelley Worthington

EXPLORING THE SOCIO-TECHNICAL ECOSYSTEM TO SUPPORT/ENHANCE LEARNING MATHEMATICS

LIGHTBOARD QR CODES
Links between a worksheet and example video via QR code
Demonstration is on a Lightboard
USES
Provides 'just in time' learning
BENEFITS
Easy & quick access to specific video demonstration, as & when needed.
Supports self-paced learning
CAVEATS
Requires outlay, setup and maintenance of both Lightboard and QR code system.
Students need devices with QR code scanning capacity.
Initial staff training required

MICROSOFT BOOKING SYSTEM
Allows easy online bookings directly with educators
USES
Interfaces with Outlook.
Empowers students to book sessions as needed
CAVEATS
Dependent on accurate calendar management

PADLET
A collaborative canvas tool used for creating virtual 'walls' to support student engagement
USES
Embeds in LMSs
Student contributions for various activities
BENEFITS
Multimodal communication.
Promotes engagement
Great option for shy students
CAVEATS
Best when a supportive environment is fostered
Not ideal for large posts

NOTION
An all-in-one workspace
USES
Creating course materials, organising class projects, and collaborative notetaking
BENEFITS
Integrates tools into one platform
Enhances collaboration
Customisable
CAVEATS
Requires maintenance and updating
Can be overwhelming, especially for new users

Images generated using Microsoft CoPilot

Murdoch University

CHARLES DARWIN UNIVERSITY AUSTRALIA