WANBEL RESEARCH SYMPOSIUM 2026

Transforming Learning, Leadership and Wellbeing Across the Pacific

STRAND C **STEM Education and Innovation**

Reimagining STEM education

Preparing learners for an uncertain future, and STEM as a catalyst for national development



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Koiari Park Campus · Pacific Adventist University

Pacific Adventist University
EDUCATE TO SERVE

Curtin University

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Australia Awards

Why rethink STEM education now?

A changing world

- Climate and environmental pressures
- Digital transformation and AI
- Changing work and skills
- Complex health and social challenges

A national imperative

- Productivity and innovation
- Resilient communities
- Sustainable resource management
- Equity of opportunity

A learning imperative

- Move beyond recall
- Strengthen agency and adaptability
- Connect learning to lived realities
- Prepare learners to keep learning

Are we preparing learners for the world as it is, or equipping them to shape the world that is emerging?

An era of uncertainty

V

Volatility

Rate of change

U

Uncertainty

Unclear about the present

C

Complexity

Multiple key decision factors

A

Ambiguity

Lack of clarity about meaning

A VUCA world (Heifetz et al., 2009). Flux shapes human survival and progress, and the reform of education (Fan & Popkewitz, 2020).

A series of unforeseen events

- The pandemic
- The Russia–Ukraine and Iran–USA conflicts
- The exponential advance of artificial intelligence
- Rising global insecurity, with cycles of globalisation and deglobalisation
- A prolonged slowdown in global growth: tighter financing and high debt ratios

An education system under internal and external pressure

Conservatism

Inherent conservatism in schooling slows adaptation to changing social needs

Social support

Uncertain socioeconomic development weakens support for reform

Labour market

A deteriorating labour market forces education reform

Generative AI

Challenges a system centred on teaching definite knowledge

Key challenge: keeping pace with innovation, student engagement, equity and digital literacy

Reconfiguring education for sustainable human development

Reshape neo-humanistic education

- Go beyond economism
- Return to human-centred education

→

Build a new model for an age of intelligent technology

- Shift from knowledge-based to competency-based education
- Empower learning and teaching with intelligent technology

→

Open the system

- Build an open and dynamic education system

Education is struggling to keep up with societal change

65%

of students entering primary school are expected to work in jobs that do not yet exist

50%

of the technical knowledge in an undergraduate degree may be obsolete by graduation

OECD (2026): three interconnected themes

1. Reimagining the teaching profession in a rapidly changing world
2. Strengthening autonomy, trust and collaboration as foundations for innovation
3. Harnessing AI as an ally for teaching and learning

Reimagining teaching demands more than incremental change.

The capabilities learners need for an uncertain future

Critical thinking

Evaluate evidence; recognise bias and uncertainty

Creativity

Generate, test and improve ideas

Collaboration

Work across disciplines, cultures and communities

Communication

Explain reasoning; represent data and solutions

Digital and data literacy

Use technology responsibly; interpret data

Adaptability and agency

Learn, unlearn, persist and take initiative

Underpinned by problem-solving and ethical decision-making

The role of STEM education: beyond content knowledge

Traditional focus

- Facts and concepts
- Subject mastery

→

Future focus

- Inquiry and exploration
- Real-world problem solving
- Interdisciplinary thinking
- Innovation and entrepreneurship

"Skills have become the global currency of 21st century economies." UNESCO (2015)

STEM is more than four subjects



Integrated STEM connects disciplines through inquiry, design, evidence, creativity and purposeful problem-solving

STEM as a catalyst for national development

1. **Human capability:** Scientific literacy, digital confidence and technical expertise
2. **Economic resilience:** Innovation, entrepreneurship and a skilled workforce
3. **National priorities:** Food and water security, health, energy, infrastructure and climate adaptation
4. **Informed citizenship:** People who can interpret evidence, question claims and take part in decisions
5. **Local knowledge:** Pathways for local research and enterprise to contribute to national solutions

STEM investment is not only an education strategy. It is a long-term development strategy.

From global challenges to local opportunities

Climate resilience

- Design flood-aware communities
- Monitor coastal change
- Explore renewable energy
- Model disaster preparedness

Blue and green economies

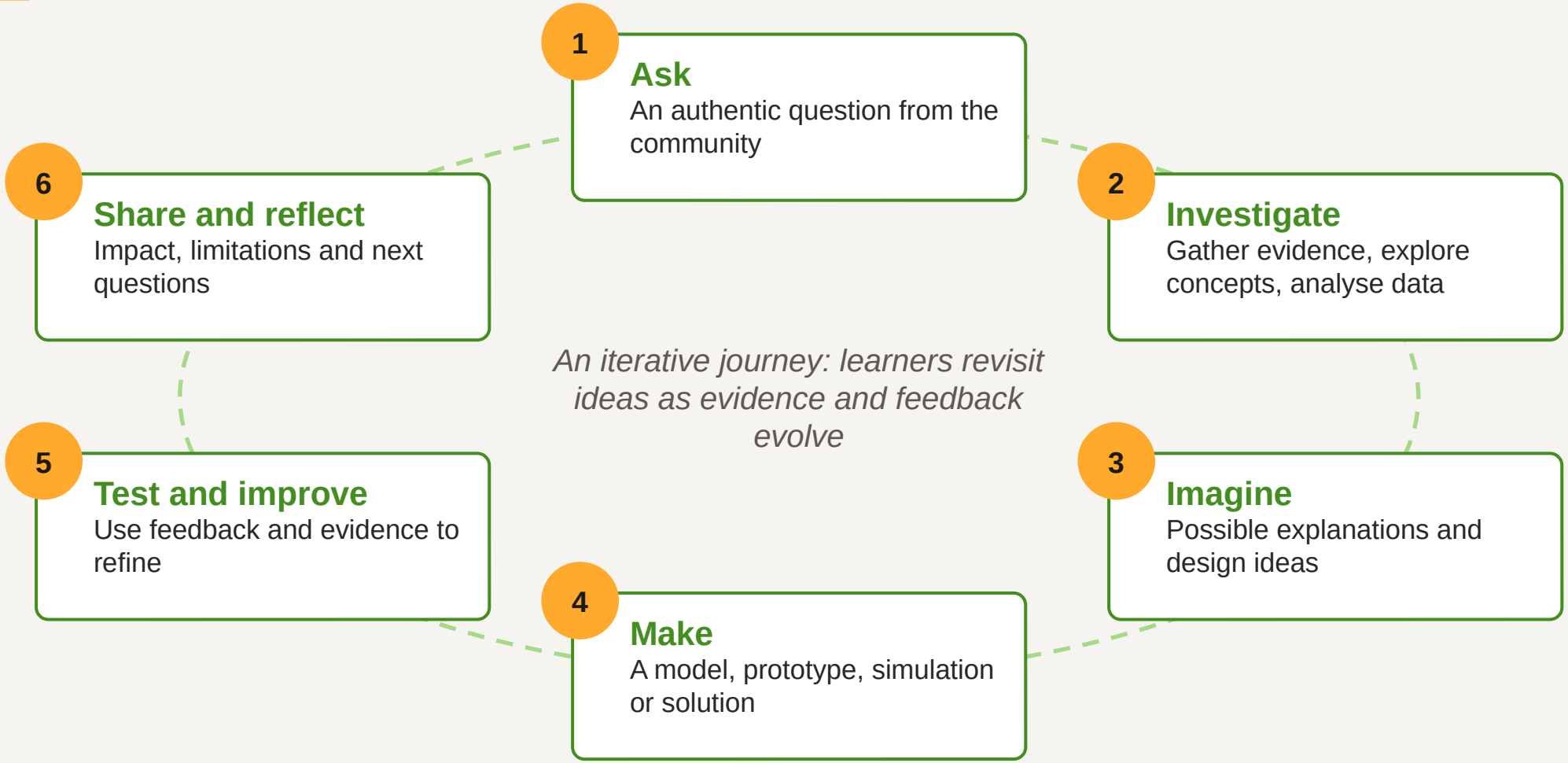
- Sustainable fisheries and oceans
- Biodiversity and conservation
- Agriculture and food systems
- Responsible tourism

Connected communities

- Digital access and connectivity
- Health technology and services
- Water and sanitation solutions
- Locally appropriate infrastructure

Pacific learners can be problem-solvers for their communities, not just recipients of imported solutions

What transformative STEM learning looks like



Makerspaces: turning ideas into capability

A makerspace can be…

- A physical or virtual space
- A culture of experimentation
- A place to prototype and collaborate
- A bridge between curriculum and community

Learners develop…

- Design thinking and problem-solving
- Creativity and persistence
- Teamwork and communication
- Digital, practical and data skills

Start with purpose

- Low-cost, local materials
- Repair, reuse and sustainability
- Local expertise and knowledge
- Assess process as well as product





A makerspace is defined by the quality of learning and design, not by expensive equipment

Project-based and problem-based learning

Problem-based learning uses complex, real-world problems as the vehicle for learning concepts and principles, rather than direct presentation of facts.

INITIATIVES FOR STEM TEACHERS

Design thinking

Structured, creative problem-solving

Makerspace

Curtin Makerspace, physical and virtual, with an online community

Engineering and technology

Hands-on activities linked to the science curriculum

STEMinists community: steminists.weebly.com

Increasing interest in careers in engineering and technology

1. **Pre-questionnaire**
2. **Introductory lesson**
3. **Three engineering activities linked to the term's science content**
4. **Post-questionnaire**

What we explored

Students' existing understanding of "What do engineers do?" and "What is technology?", measured before and after the activities to evaluate the difference.

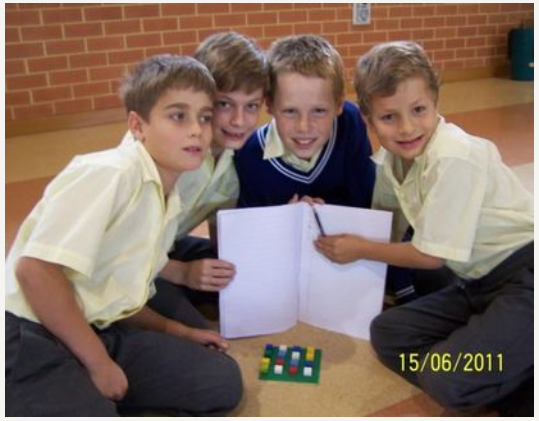
Projects in action



Oil spills



Solar houses



Nano-technology



Electric circuits

TEACHER FEEDBACK

"My Year 5 class have really taken on board the Solar Passive House project and are extending the knowledge they have derived from their designs to plan and build their own Solar Passive Homes… my class is turning into a box village! It is great to witness their enthusiasm and engineering skills!"

Equity and inclusion must be designed in

Access

Participation not determined by gender, disability, geography, language or family income

Relevance

Connect STEM to local environments, cultures, livelihoods and priorities

Representation

Diverse STEM role models, knowledge holders and career pathways

Belonging

Classrooms where questioning, experimentation and productive failure are safe

Partnership

Families, industry, universities, schools and community organisations

Excellence in STEM is inseparable from who gets to participate, and whose knowledge counts

What needs to change across the STEM ecosystem?

Curriculum

Prioritise big ideas, inquiry, integration and authentic problems

Teachers

Invest in professional learning, confidence, collaboration and resources

Assessment

Value reasoning, design processes, teamwork, communication and reflection

Leadership

Align policy, funding, partnerships, infrastructure and long-term evaluation

Sustainable change requires coherence: policy, curriculum, pedagogy and assessment must reinforce one another

CALL TO ACTION

A practical agenda: from aspiration to action

1. Identify a small number of national and local STEM priorities, and make them visible in learning
2. Create teacher learning networks that share resources, practice and evidence
3. Establish school–community–industry–university partnerships around real challenges
4. Support inclusive, low-cost inquiry and making, including in rural and remote settings
5. Track outcomes: learner capability, participation, teacher confidence and community impact

Begin with one meaningful challenge. Build partnerships. Learn from evidence. Scale what works.

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Reimagining STEM is a national choice

From	Teaching content	→ to	**Developing capability**
From	Isolated subjects	→ to	**Integrated problem-solving**
From	Imported answers	→ to	**Locally grounded innovation**

What future will our learners be empowered to create?

Thank you · Professor Rekha Koul, Curtin University

Questions for the panel

Your turn: from the world picture to shared questions

1 Talk

In small groups, pick one idea or finding from today. What could we do with it in PNG and the Pacific?

Adopt · Adapt · Contextualise · Leverage · Avoid · Remediate

2 Choose

Agree on the idea that matters most to you, and the response that fits.

3 Shape

Write one research question together, using a question starter.

4 Share

Hand in your question. It will be shared and built on through the rest of the Symposium.

CHOOSE A QUESTION STARTER

Explore How do **[who]** across **[institutions or countries]** experience or use **[the idea]**?

Compare How does **[outcome]** differ for **[who]** across **[institutions or countries]**, and why?

Test To what extent does **[an adapted practice]** change **[a measurable outcome]** for **[who]** across **[institutions or countries]**?

How would we know? What would each site measure or collect?

Who would work on this? Names, institution, country.

A good question is **Focused · Shared · Answerable with evidence · Open**