



The Innovative Engineering Curricula project

Innovation and Learning Practice

Bridging Innovation and Learning in TVET (BILT) Project

Submitted by Durban University of Technology, South Africa

The Innovative Engineering Curricula project – a multi-disciplinary, multi-stakeholder initiative – aims to modernize engineering education in South Africa by integrating competency-driven learning, industry engagement and professional development for educators.

Start date: 2021

Type of implementing institution: Higher education institution

Implementing partners: Constituent of South African Higher Education Institutes and University College London, UK, in collaboration with the South African Society for Engineering Education (SASEE) and the Engineering Council of South Africa (ECSA)

Funding programmes: **Transforming Systems Through Partnership** grants from the Royal Academy of Engineering and Department of Higher Education and Training (DHET) and a University Capacity Development grant

Target group: Academic staff, students, industry professionals



Durban University of Technology

The Durban University of Technology (DUT) is a leading South African institution, offering a dynamic, multicultural learning environment. Focused on excellence in education, research and community engagement, DUT provides career-oriented training to equip students for workplace success.

Description of activities

The Innovative Engineering Curricula (IEC) project seeks to transform engineering education in higher education and across TVET institutions by developing integrated, competency-driven curricula that prepares graduates for complex, real-world challenges. The project brings together academics and industry and accreditation bodies to develop sustainable, responsive and globally competitive engineering education frameworks.

Relevance

What issues is the IEC project designed to address?

Engineering education in South Africa has traditionally prioritized content delivery over skills development, leaving graduates technically proficient but lacking in the skills needed for the workplace, such as critical thinking and teamwork. In addition, limited training for academics in learning facilitation hampers their ability to deliver student-centred teaching. A lack of collaboration between education and industry restricts graduates' exposure to real-world professional experiences, making it challenging for them to transition smoothly into the workforce.

What strategies does the project employ to address these challenges?

The project has developed the following strategies:

Integrated curricula: Development of a framework to implement integrated curricula across South Africa's engineering programmes that aligns accreditation standards and industry needs with academic outcomes.

Implementation policies: These include pilot project integration and structured approval processes to ensure institutional support and scalability.

National and regional workshops: Through which academics, industry experts and policymakers co-design curricula, share best practices, support teaching capacity and promote a student-centred learning pedagogy.

Staff development: Support includes training programmes and mentorships designed to equip educators with skills for active and integrated learning.

Incorporating global best practice: Programmes such as **Engineers Without Borders** and **Change Makers in Engineering Education** help to foster ethical awareness, intercultural communication and interdisciplinary skills.

Is the IEC project part of a wider initiative or goal?

The initiative supports South Africa's higher education authorities' call for innovative teaching and learning practices that prepare graduates for the 21st century workplace. The project aligns with **Sustainable Development Goal 4** and **UNESCO's Strategy for TVET 2022-2029**, which focus on skills for individuals, sustainable economies, inclusive and resilient societies, equitable education and lifelong learning.

Added value

What is new about the IEC project?

The project recognizes that sustainable educational reform depends on engineering academics who can embrace change, navigate complexity and uncertainty, and overcome systemic constraints.

Through IEC's *Change Makers in Higher Education* initiative, the project builds communities of learning where individuals engage in collaborative knowledge creation, peer support and leadership development. Additionally, it's **Transformative Teaching in Engineering Education** (TTEE) initiative provides 100+ hours of skills development including through coaching and mentoring at institutional and national levels.

What stage of implementation is the initiative currently at?

As of February 2025, the project has facilitated:

- **27 online workshops**, engaging academics on curriculum transformation, professional competencies and systemic change.
- **Two regional workshops**, facilitating cross-institutional collaboration.
- **Two industry Indabas** (Zulu for 'important meetings'), bringing together academia and industry and accreditation bodies to align graduate attributes with workplace expectations.
- **Six national Change Makers in Engineering Education programmes** and **seven Change Maker workshops**, fostering leadership and professional development.

What positive outcomes has the initiative achieved?

Since inception, online and in-person workshop participation has rapidly increased, the email network has expanded to over 400 members and regional hubs – a collaborative centre for higher education academics and industry experts – have expanded to include five provinces.

The project has influenced policy by contributing to the **2023 accreditation policy revisions** and has also begun shifting mindsets, strengthening graduate employment readiness, improving academics' well-being and developing socially responsible engineering education systems.

Transferability

Does this initiative constitute a learning opportunity for other TVET stakeholders?

The following elements could be replicated to support similar initiatives:

- **Integrated curriculum model:** Aligning TVET programmes with industry needs.
- **Faculty development and resilience:** *Change Makers* and *TTEE* models provide structured mentorship and support to enhance educator capacity.
- **Industry and accreditation engagement:** Structured collaboration strengthens work-integrated learning.
- **Scalable online learning and regional networks:** Hybrid workshops connect TVET institutions across regions promoting knowledge-sharing and professional growth.

What advice could be offered to those wishing to replicate this initiative?

To overcome institutional resistance, early leadership engagement is crucial. Capacity-building programmes with mentorship and coaching can address educator limitations, while regional industry forums ensure graduate skills align with industry needs. Resource and digital access limitations can be overcome through scalable, low-cost models such as blended learning and peer-led hubs.

Many resources are **available online** including workshop recordings, guides, frameworks, and case-studies, plus monthly online workshops and mentoring sessions.

Has the initiative been promoted in any national or international contexts?

The project has been showcased at global forums including the **World Engineering Education Forum** and the *Regional Engineering Education Symposium* and recognized by the **Royal Academy of Engineering** among its top five 'Transforming Systems through Partnership' projects. Its impact has grown through the **African Engineering Education Research Network**, with EU funding extending its reach to Kenya, Nigeria and Uganda. More details are in the **RAE case study**.

The Innovative Engineering Curricula project is one of the BILT project's Innovation and Learning Practices that address systemic challenges within the five work streams of the project.

Specifically, this initiative addresses new qualifications and competencies in TVET.



New qualifications and competencies in TVET

- *Identifying new qualifications and competencies in a timely manner;*
- *Integrating them into appealing and flexible curricula and training regulations; and*
- *Implementing them in innovative training approaches.*

Additional Innovation and Learning Practices cover the following areas:



Digitalization



Entrepreneurship in TVET



Greening TVET



Migration and TVET

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More information about this practice
[Project website](#)

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About the BILT Project

UNESCO-UNEVOC's Bridging Innovation and Learning in TVET (BILT) project is a reference point for innovation and learning in TVET. It fosters global policy dialogue and peer learning among TVET stakeholders while promoting innovation and inclusive excellence in TVET. BILT complements developments at the national level in supporting innovative, market-oriented and attractive modes of learning and cooperation in TVET.

The BILT project explores the process of identifying, integrating and implementing new qualifications and competencies in TVET. This is known as the 'three I's process'.

In addition to the broad focus on new qualifications and competencies, BILT addresses four complementary themes: Digitalization in TVET, Greening TVET, Entrepreneurship in TVET, and Migration and TVET.

For more information, please visit
www.unevoc.unesco.org/bilt

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New qualifications and competencies in TVET

- **Identifying** new qualifications and competencies in a timely manner;
- **Integrating** them into appealing and flexible curricula and training regulations; and
- **Implementing** them in innovative training approaches.

Entrepreneurship in TVET

Unlocking the potential of innovative entrepreneurial activities and fostering entrepreneurial culture

Greening TVET

Responding to new development paradigms for sustainability and reduced environmental impact

Digitalization in TVET

Providing response to new skills demands, as technology has permeated the world of work and is changing the profile of jobs

Migration and TVET

Accelerating the integration of migrants into their host communities, and allowing them to become productive members of the workforce

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