

Innovative Practices

At a glance



Berufskolleg
an der
Lindenstrasse
(BKAL)



GERMANY



Seychelles
Institute of
Technology (SIT)

SEYCHELLES

Malta College
of Arts, Science
and
Technology
(MCAST)



MALTA



Technical
Education and
Skills
Development
Authority
(TESDA)
Women's center

PHILIPPINES

OMNIA – The
Joint Authority
of Education in
the Espoo
Region



FINLAND



Tknika

SPAIN

Shenzhen
Polytechnic



CHINA



University of
Vocational
Technology
(UNIVOTEC)

SRI LANKA

Rift Valley
Technical
Training
Institute
(RVTTI)



KENYA



Yaba College of
Technology
(Yabatech)

NIGERIA

The summary compilation was developed based on the information provided, and through the collaboration of the Project Coordinators and the management teams in the i-hubs Project Partners.

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Foreword

Technical and Vocational Education and Training (TVET) has a transformative and cross-cutting role in addressing the individual, social, economic and environmental challenges, that were identified in the Sustainable Development Agenda and UNESCO Medium-Term Strategy.

The 2018 UNESCO-UNEVOC Global Learning Forum mapped the cycle of disruption, innovation and transformation, particularly in the areas of entrepreneurship, digitalization in the workplace and green economy transition, which is reshaping how citizens, societies and business live and work. The Forum also brought to fore debates around the current scale and speed of change, which requires a new level of response, and called upon TVET institutions to lead the change from bottom-up.

Inspired by the ongoing debate and demands, in the period from November 2018 to March 2019, UNESCO-UNEVOC, together with international experts and practitioners from pioneering institutions from Africa, Asia and Europe, started working on a collaborative project called the Skills for Innovation Hubs (i-hubs) Initiative. The project, supported by the Beijing Caofeidian International Vocational Education City (BCEC), German Federal Ministry of Education and Research (BMBF) and the Federal Ministry for Economic Cooperation and Development (BMZ), focuses on the co-development of an Innovation Framework and testing of tools and methodologies that help to articulate innovation in the different aspects of institutional work.

UNESCO-UNEVOC is now working with ten institutions from the UNEVOC Network, which act as project partners and Innovation Hubs (i-hubs), and actively share their experiences in innovation. In this context, innovation is understood as a substantial change in the way TVET is organized, planned and practiced to make it more responsive, and therefore relevant to the current issues in society, the economy, and the environment.

The experiences that are shared provide insights into the key success factors and barriers in leadership and organizational practices; teaching and learning processes; products and services, and relations with the skills and innovation ecosystem – collectively known as essential aspects of innovation.

The activities that transpired in the past few months resulted in the development of (1) a self-assessment process (*Guided Self-Assessment*). An evidence-gathering tool to facilitate an institution-wide analysis of innovation capacity across the dimensions (*Balanced Scorecard*) and the tool for mapping the innovation potential in the ecosystem (*Skills and Innovation Ecosystem Map*), constitute this process. The process helped generate a good amount of quantitative data and qualitative information from external and internal stakeholders of the i-Hubs, and achieved insights into performance and remaining gaps.



Skills for Innovation Hubs (i-hubs), Project Launch, 28-29 March 2019. Photo © UNESCO-UNEVOC

The project facilitated the implementation of the Innovation Framework from June to November 2019. To date, nine project partners have successfully completed the pilot-testing process. They have documented evidence-based stories of successful innovative practices, which confirm high performance and commitment to innovation of the i-hubs.

The UNESCO-UNEVOC i-Hubs Project Team presents the Innovative Practices at a Glance. The document contains compelling stories of innovation in TVET. I do hope you find the document informative and that the i-hubs project partners will stay inspired in taking bottom-up innovation in TVET forward.

Shyamal Majumdar
Head of UNESCO-UNEVOC International Centre

What is an Innovative Practice?

Telling the story of innovation in TVET

Like all education bodies and institutions around the world, Technical and Vocational Education and Training (TVET) centres are impacted by major economic, societal, and environmental disruptions. Digitalization is changing job roles and profiles of skilled workers needed in the workplace. Likewise, entrepreneurship is evolving and this change is showing how technology is revolutionizing the way business venture is created and run. Climate change and transition to clean energy and circular economy are creating new demands for innovation and creativity.

All these require a rethinking of the role of TVET institutions, which is beyond the tasks of determining a range of skills needed to be acquired by the modern workforce and adapting training and learning to develop the knowledge, skills and competencies. Instead, TVET institutions are increasingly required to recognize and embrace a new role - which calls for an active engagement in the innovation – and take part in the process that increasingly demands synergy with businesses, communities, and schools. This requires the agility to navigate through an uncharted territory.

I-hubs leading change with Innovative Practices

The Skills for Innovation Hubs (i-hubs) initiative implemented by UNESCO-UNEVOC creates opportunities for TVET institutions that are innovating, to make a substantial change with the aim to tackle today's disruptions, systematize a new way of thinking in their actions, and seamlessly mainstream a culture of innovation in the



On-site meetings between representatives from UNESCO-UNEVOC and each i-hub were an important part of the process. Photo © RVTTI

different aspects of work and outcomes of the institutions. It provides support and guidance to prompt substantial change in the way institutions operate and achieve results, and catalyse Innovative Practice that meets the conditions in the critical aspects of an institution's work (*organizational leadership and practices, teaching and learning processes, products and services, relations in the skills ecosystem*).

The Process

An Innovative Practice is identified based on the general parameters and notion of innovation in the institutional environment. It is expressed through actions and commitment of the i-Hubs project partners to innovation, in order to address the skill challenges and exponential demand for skills to meet entrepreneurship opportunities, as well as to address skills mismatch due to digitalization of the workplace, and green transition of economies.

The specific Innovative Practices in the i-hubs project partners were further drilled down, with the help of the i-Hubs Innovation Framework that helped break down the unique aspects of the practices. This includes their goals, the transversal and technical skills contents, the key learnings invoked, the challenges, modes of implementation in the local environment, the interfaces with the internal and external stakeholders, and future directions.

The process confirmed the innovative character of the TVET practice and established an understanding of how it supports the i-hubs in nurturing its capacity to innovate, what criteria are met vis-à-vis the Balanced Scorecard, how the ecosystem benefits from or contribute to the practice, and what aspects of the practice could be shared to foster learning on innovation.

Purpose of the compilation

This compilation contains the summaries of the Innovative Practices identified during the project implementation. The summaries highlight the resulting outputs from the Innovative Practice, and provide a narrative on the strengths and good practices in the institution, the framework conditions for success, and opportunities for scaling and mainstreaming.

The summaries represent a snapshot of the progress achieved and the trajectory to which future effort is directed. They provide a quick overview of the result of analysis of the innovation performance of project partners, drawn from guided self-

assessment. The overview uses a ‘speedometer’, which is a metaphor used to depict the speed and motion of innovation evidenced during the project implementation.

A full compilation of the Innovative Practices generated from the i-Hubs initiative will be developed in 2020.

Bringing together the story of i-hubs is a reflection of diversity and the range of ingenuity available in the UNEVOC Network.

For more information about the project, please refer to the official website of the Skills for Innovation Hubs project: <https://unevoc.unesco.org/i-hubs/>.

Entrepreneurship and Entrepreneurial Learning

Malta College of Arts, Science and Technology (MCAST), Malta

The island nation of Malta is home to many small and medium enterprises (SMEs) and micro businesses in a dynamic entrepreneurial landscape. To ensure its students are equipped with the skills to keep up with rapid change, the Malta College of Arts, Science and Technology (MCAST) maintains an Entrepreneurship and Entrepreneurial Learning programme that is second to none

The macro impact of micro businesses in Malta

In many countries, a deep-dive analysis of industry might reveal that a number of large businesses employ the bulk of a nation's workforce. This is not the case in Malta: of the roughly 103,000 registered businesses in the nation, only 112 employ more than 250 employees. The rest employ less than 50 people and are considered SMEs; most (97.3 percent of all businesses in Malta) are considered micro businesses with fewer than 10 employees.¹

Given this background to the business sector in Malta, it was fitting for MCAST to establish its Entrepreneurship and Entrepreneurial Learning programme aimed at teaching students how to start and operate a successful small business. The programme has been up and running for 10 years now, but thanks to MCAST's

¹ Source: National Statistics Office Malta, https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_B4/Business_Registers/Documents/2018/News2018_068.pdf [Table 4]]

Strategic Initiative 2019-2021, entrepreneurship training will become even more firmly embedded in MCAST's curriculum.

New innovative practices in teaching, learning, and collaboration with business stakeholders represent a significant step forward at an institution already at the forefront of TVET in Malta.

Entrepreneurial and educational agility

Even with a decade of experience in teaching entrepreneurship to future business leaders in Malta, MCAST continually evaluates and fine-tunes the Entrepreneurship and Entrepreneurial Learning programme. Most recently, the institutions' Strategic Initiative 2019-2021 listed specific commitments to innovative entrepreneurial education. These include:

- Positioning work-based learning (WBL) at the heart of all professional and vocational training programmes
- Encouraging teachers to integrate more real-world experiences in classroom teaching and to explore innovative ways of taking the learning beyond the classroom
- Building capacity of industry mentors to provide more valuable work experiences
- Establishing emulative training centres to provide students with additional practical experiences in a work-like environment

In short, MCAST is committed to connecting students to practical experience and real-world scenarios. This is increasingly a priority among TVET institutions around the world: new forms of entrepreneurship are emerging at a rapid pace, which comes with risks and opportunities. TVET schools caught flat-footed risk sending ill-equipped students into the workforce. However, TVET schools that keep a finger on the pulse of the latest entrepreneurial developments do their students a great service.

MCAST has made it a priority to remain in sync with a rapidly evolving business landscape. This is reflected in its ever-evolving entrepreneurship training modules, which start with Level 4 students (16 to 19 years old) learning about "key skills" in entrepreneurship and continues to Level 6 students (18 to 25 years old) taking on a mandatory entrepreneurship unit and pitching business ideas to an advisory board.

As students move from learning the basic key skills of entrepreneurship to exploring specific ideas for business ventures, MCAST has systems in place to ensure its instruction provides the skills and entrepreneurial mindset required to thrive in a rapidly changing business world. This begins with teachers who work directly with industry experts on developing the entrepreneurship curriculum and training units.

This is mutually beneficial: contact with industry representatives helps teachers develop relevant and engaging methods that incorporate WBL, while practitioners gain insight into the role they play in entrepreneurial learning as MCAST business mentors. The result is a nimble curriculum that works for the benefit of students by providing face-to-face meetings with business mentors, a variety of learning environments, free opportunities for business incubator facilities and services, and the availability of digital and IT technologies.

The curriculum includes opportunities for students to work together across disciplines in developing ideas for a product or service. These projects, which are for credit and usually undertaken by Level 6 students, span the course of an academic year. At the end, the students present their ideas to a committee. In many cases, the committee recommends that the students take the first step as a start-up by applying for a spot at the incubation centre. It is not uncommon for these ideas to take off very quickly.

MCAST's approach ensures that entrepreneurial students can explore all aspects of launching a business, without the costly mistakes and pitfalls that new businesses often face. Teachers implementing the latest industry innovations into instruction and the insights of business mentors are readily available to the students as they gain the knowledge, confidence, and contacts they will need to keep their business ventures afloat.

Close ties to the business community

One of the reasons MCAST continues to be at the forefront of TVET in Malta is because of its close industry ties, which allow quick implementation of the latest entrepreneurial developments that are relevant for students. One important partner is Malta Enterprise, the country's economic development agency. As part of its mandate to facilitate the growth of new and existing business operations, Malta Enterprise has been instrumental in providing industry contacts who work with MCAST teachers and students as mentors. The agency also plays an important role in keeping business incubator facilities and services free of charge for MCAST students.

Outside of Malta Enterprise, MCAST has direct contacts with more than 800 businesses that support WBL efforts, providing yet another avenue for students to benefit from real-world experience while finding their footing as future entrepreneurs.

Additional input on MCAST's readiness to meet the current skill demands of the wider business world in Malta comes from the Malta Skills Council and the Ministry for Education and Employment. By the time when the students graduate from MCAST, they are ready to make a direct contribution to the national economy with businesses that are viable and well suited to the prevailing business environment.

Regular reinvention

Although the Entrepreneurship and Entrepreneurial Learning programme has been in place for several years at MCAST, the true Innovative Practice is about making sure the programme is re-invented continuously to best serve the needs of the students and stakeholders in the local environment.

By monitoring the ever-shifting entrepreneurial trends in Malta, maintaining close ties to practitioners, nurturing the students' drive to engage in business through an expanding array of facilities and services, and continually evaluating the importance and priority of entrepreneurial training within the entire institution, the school's success as an innovative TVET institution is evident. MCAST demonstrates the importance of remaining vigilant and flexible in order to avoid stagnation and an unchanging status quo.



MCAST Environmental engineering students learn biological survey techniques to study the vegetation communities at Qalet Marku in Malta. Photo © MCAST

Innovation performance of MCAST



*Source: MCAST, Innovation performance based on
Balanced Scorecard results (14 June 2019)*

Innovation Awards

Rift Valley Technical Training Institute (RVTTI), Kenya

At Kenya's Rift Valley Technical Training Institute (RVTTI), what began as an incentive for developing technical innovation has evolved into a showcase for new technology made by TVET students

Rewarding technical innovation by TVET students

In Kenya, RVTTI is recognized as a national TVET innovation hub and is seen as a centre of quality management among TVET institutions. From this position, RVTTI is keenly aware of the need to prepare young people in Kenya for new economic opportunities by improving their skills, employability, competitiveness, efficiency, and capacity for innovation. A few years ago, the institution also observed a growing

consensus among stakeholders of a need to encourage innovation in TVET so students were better prepared to address issues facing society. They noted that funding issues often meant innovations created by young people were not getting off the ground.

As a result, in 2015, RVTTI introduced its Innovation Awards. The cash prizes for products and services promote and nurture student innovations in support of commercialization and income generation, employment, and youth entrepreneurship. After four years, the Innovation Awards are firmly established and shining a spotlight on the creativity and innovative abilities of TVET students in the region.



Ms Peninah Kemunto, RVTTI student, won first prize for her 'termite biscuits on the RVTTI's 2019 Innovation Awards competition.

Expanding across Kenya

At the first RVTTI Innovation Awards, innovative technological solutions were presented – without prize money or selecting a winner – as part of RVTTI’s annual international TVET and interdisciplinary research conference. Subsequent years included a more targeted call for submissions, but participation was limited.

Thanks in part to concentrated publicity efforts, the 2019 edition of the Innovation Awards was a breakthrough: RVTTI received 18 submissions from across Kenya. A panel of judges – representatives of the business community and experts in relevant fields – evaluated the submissions based on criteria including scientific quality, novelty, and market feasibility. Compatibility with the UN Sustainable Development Goals and the “Big 4” in Kenya’s Vision 2030 – food security, affordable housing, enhancing manufacturing, and universal health care – was also considered an important factor in the evaluation. Prizes were awarded for the following innovations:

- First prize (around \$2,000 USD): A RVTTI student’s ‘termite biscuit’ concept, which uses termites in food items
- Second prize (\$1,000): A single row self-propelled planter by two RVTTI students
- Third prize (\$500): A multi-storey garden concept for maximising household gardening space by two students from Thika Technical Training Institute
- Principal’s Award (\$500): Awarded to two RVTTI students for an app called the Medibot, which helps people access medical services and doctors online

The surge in submissions, the broad spectrum of represented fields, and regional participation in the Innovation Awards all stem from RVTTI’s efforts to increase support for the project among internal and external stakeholders.

Within the institution, a coordination office for research and development was established to create an enabling environment for innovations to thrive. The office oversees the Innovation Awards. Additional refinements to the Innovation Awards included new stipulations on submissions that increased both their quality and overall value to students. Submissions from all students must now be patented with the Kenya Industrial Property Institute, and RVTTI provides help during this process.



RVTTI’s single row self-propelled planter took second prize on the RVTTI’s 2019 Innovation Awards competition.

Photo © RVTTI

RVTTI students also benefit from dedicated classroom time and access to ICT tools as they work on their inventions.

Another important factor in the competition is the exclusion of students from university programmes. This is a key distinction: university innovation competitions are not a new practice, but RVTTI's Innovation Awards were created to specifically recognize inventions by TVET students. It calls attention to the role of TVET institutions in providing skills necessary to address real-world problems, and showcases the students' talents and potential for innovation. Looking beyond the competition itself, encouraging young people to pursue entrepreneurial endeavours is seen as one way to lower the unemployment rate in Kenya.

The best of TVET on display

Through the Innovation Awards, RVTTI helps demonstrate the value of TVET to a large group of external stakeholders. This is achieved first and foremost by RVTTI's annual conference, which it hosts in Eldoret, Kenya. The conference draws senior government officials, staff and students from other TVET institutions, international industry experts and business representatives, university researchers and students, and the media. The student exhibitions and onsite evaluation of the short-listed entries in the Innovation Awards are among the highlights of the conference.

Given that the innovations submitted to the competition are practical solutions to real-world problems, the students and their inventions receive a fair amount of attention. This is as useful for other participating TVET institutions as it is for RVTTI.

The private sector also has an important role to play in the Innovation Awards. In addition to providing financial support, RVTTI is looking for ways to provide students with subsequent steps on how to make their projects viable. Established businesses can help scale up the innovations presented by the students.

From prototype to viable business

RVTTI is already accepting submissions for the fifth edition of the Innovation Awards, which will take place in the summer of 2020 and are open to any TVET student in the East Africa Community. As RVTTI looks ahead to the next round of submissions, the school has recognized that one of the most important elements for success in running an innovation competition is the credibility of the evaluation process. It lends legitimacy to the winners and is an opportunity for the rest of the competitors

to receive valuable advice and ideas on how to improve their products. The prize money itself is also an important factor for long-term success. Ideally, RVTTI would like to establish a group of rotating sponsors for the prize money.

Finally, while the Innovation Awards are a unique way of recognising the talent and ingenuity of TVET students, a further and potentially more valuable piece to the puzzle is providing students with guidance on how to make their ideas viable in the long-term. Including this in RVTTI's Innovation Action Plan represents a significant step forward, both in terms of the maturity of the Innovation Awards and the innovation leverage potential.

Innovation performance of RVTTI



Source: RVTTI, Innovation performance based on the Balanced Scorecard results (28 June 2019)

BKaL 360

Berufskolleg an der Lindenstraße (BKaL), Germany

For many young people, the path through school and into higher or technical education is often associated with rigid interpretations of what is considered the norm. But what if there were more options that allowed schoolchildren a degree of flexibility, while providing a more robust vocational education? The Berufskolleg an der Lindenstraße (BKaL) in Cologne, Germany, is exploring ways of making this an attractive option

Innovating guidance on career options

Innovation in TVET often refers to new methods of teaching and learning, new products, new qualification programs, alternative paths toward lifelong learning skills, or emerging forms of entrepreneurship. But at the Berufskolleg an der Lindenstraße (BKaL) vocational school in Cologne, Germany, a new approach to the entire concept of secondary school, vocational training, and university certification is taking hold and changing norms long held by teachers, students, parents, and business stakeholders.

By working within the school's own network of 16 courses of study and by shifting expectations among external stakeholders, the BKaL 360 approach toward attracting students to TVET is as promising as it is intriguing. As the name suggests, it quite literally takes students full circle: BKaL's efforts begin before students even enrol, continue during their time at the institution, and will soon feature activities involving alumni.

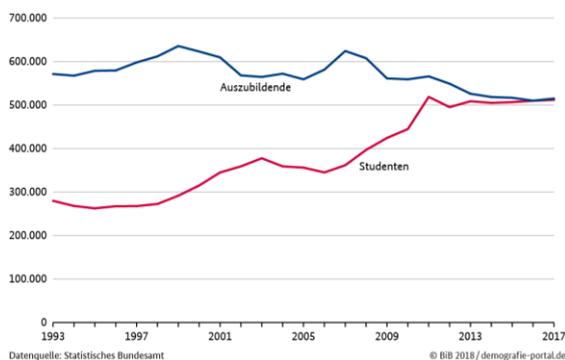
The school's students fall into two camps: full-time and part-time students. Full-time students aim to complete secondary school leaving certificates for studies at

university or a university of applied sciences. Part-time students attend school for two days per week while completing an apprenticeship three days per week over the course of three years. BKaL 360 seeks to combine the opportunities inherent in both the full-time and part-time paths to ensure all students can utilise BKaL's vocational expertise, excellent general education, and links to the business community.

Best of both worlds

Traditionally in Germany, adolescents approaching secondary school age are faced with a choice: pursue a path through secondary school that leads to university or a university of applied sciences, or take a vocational track and begin an apprenticeship. Adolescents choosing either path generally attend a school that corresponds to their choice.

As a rule in the past, those pursuing university studies would usually attend a *Gymnasium* for A Levels, while those interested in vocational education would attend a *Realschule* before switching to an institution like BKaL in tenth grade. However, the *Realschule* is increasingly being replaced by the comprehensive *Gesamtschule*, which offers A Levels but not vocational training. With the *Realschule* disappearing as a steppingstone toward vocational education and a general shift away from young people pursuing apprenticeships, BKaL faces competition from *Gymnasium* and *Gesamtschule* when it comes to students making their selection for secondary education.



New apprentices and university students, 1993-2017

*Number of new vocational training placements and first-semester university students
Auszubildende = Apprentices
Studenten = University students*

Source: Statistisches Bundesamt;
<http://www.demografie-portal.de/SharedDocs/Informieren/DE/ZahlenFakten/Ausbildung-Studium.html>

However, BKaL's advantage is that it provides the best of both worlds: an increased vocational and business focus in secondary school education for university-bound students, and more higher education opportunities for vocational students. BKaL's approach is unique: it aims to provide students with a better grasp of the labour market along with the most relevant and up-to-date professional skills.

BKaL 360's effectiveness begins with the school's management, which has made its efforts to provide career orientation alongside a top-notch general education a top priority. As an example, the school's "pedagogical days" bring the entire teaching staff together for training by internal and external lecturers on topics such as classroom management and digitization. An internal strategy reorientation places a much greater emphasis on BKaL 360, and implementation has taken a bottom-up approach led by teacher working groups.

Student participation is another important part of BKaL 360. Part-time students – who take part in a dual system of classroom lessons and vocational training – are called upon to present aspects of their vocational education and apprenticeships to full-time students. This is meant to be an exchange among peers on equal footing.

Vocational students benefit from increased exposure to the opportunities of higher education. For example, BKaL provides these students with a direct path to a certificate comparable to a bachelor's degree in business administration, and works with talent scouts to help students identify additional career and university opportunities.

Curricular concepts, performance evaluation criteria, media concepts, annual didactic planning, and teaching goals are transparent and accessible to teachers and students. Internal stakeholders are therefore all on the same page when it comes to BKaL 360 and expanding its concepts within the school.



*BKaL students took first and second place at the StartUp Weekend Education Cologne.
Photo © BKaL*

Creating a viable option

The next step for BKaL 360 involves expanding the programme to all of the school's 16 disciplines while earning buy-in and increased legitimacy from external stakeholders.

Networking opportunities within the school make the challenge easier to address. Teachers and current students are strong advocates for the programme and can attest to its value across all disciplines, and future plans include involving alumni. BKaL has recognized that current career orientation projects at the school tend to be perceived as somewhat isolated; part of the BKaL 360 effort is to put the full weight of the school behind future projects.

With new efforts to maintain closer ties to former students, alumni participation will soon include job fairs aimed at providing career guidance to prospective and current BKaL students – conversations that can take place on equal footing.

Parents are a harder sell. Many parents are simply unaware that higher education qualifications can be achieved alongside vocational education and training. It is a common belief that *Gymnasium* and *Gesamtschule* are the only options available for students in Germany who want to attend sixth form and obtain a university entrance certificate. Part of BKaL's plan to gain support for its innovative TVET approach is to engage parents while their children are still in primary school and inform them of another option, namely the possibility of attending sixth form while also receiving excellent business and administration career guidance at BKaL.

"We were sold right away on BKaL's concept when we were selecting a school. The range of options and efforts to continually improve on what the school offers are impressive. We are glad we went with BKaL."

Mother of a BKaL student

In contrast, the business community has been quick to embrace BKaL 360. By strengthening vocational education for BKaL students, businesses – especially those sending apprentices for part-time studies – see an opportunity to target vocational education and training to their specific needs. BKaL counts high-profile businesses

such as the supermarket chain Aldi or the professional football club 1. FC Cologne among its existing partners.

Moving forward, BKaL 360 envisions increasing the number of companies providing apprentices to the school's student body and increasing communication in both directions with these business partners.

Finally, one of BKaL's important hallmarks is its multiple certifications that lend credibility and clout with students, parents, and business partners. These include certifications as:

- School of the Future (Fraunhofer Institute for Building Physics project towards zero emission with high performance indoor environment)
- Good Healthy School (State of NRW Health and Education initiative for schools implementing their education mission using health education and training)
- Fairtrade school (Initiative from TransFair recognizing schools that incorporate the principles of fair trade into the curriculum and the sale of fairly-traded products)
- UNESCO-ESD site

By meeting the benchmarks set by each external institution, BKaL positions itself as a leader in sustainability and modern holistic education – important selling points that BKaL can use to gain additional support from external stakeholders and students.

Embracing change

BKaL's approach to secondary education represents a challenge to a system that has been long-established and embraced in Germany. However, it also represents a clear understanding of the changing business landscape and the evolving role TVET needs to play in the lives of young people.

With the BKaL 360 project, the school hopes its students will be well prepared for the changing labour market and have a smooth transition to working life. The economic, social, cultural, and ecological skills learned during a holistic course of study at BKaL ensure students will leave school with a solid sense of their own role and potential in shaping the future.

Innovation performance of BKaL



Source: BKaL, Innovation performance based on the results of the Balanced Scorecard (4 July 2019)

Innovative Projects in Community Environmental Services

Seychelles Institute of Technology (SIT), Seychelles

The Seychelles Institute of Technology (SIT) is a one-of-a-kind institution in the island country of Seychelles. As such, it takes the responsibility of remaining on the cutting edge of TVET innovation seriously, with new teaching and learning methods and a forward-thinking strategy profoundly impacting the country's vocational education

Innovation Pipeline

Every nation on earth is facing economic, societal, and environmental disruptions, brought on by climate change and new demands on the workforce. For some nations – such as the island nation of Seychelles with its limited land and human resources – these challenges are increasingly existential: youth unemployment and an influx of expat labour pose challenges to the economy, while climate change is raising urgent questions about sustainable development. Addressing these problems requires new skills and approaches, a reality that SIT has turned into an opportunity for its staff and students.

As Seychelles' sole TVET institution, SIT recognized its duty to adapt its teaching and learning principles, while positioning itself as a proactive partner in innovation to government institutions, NGOs, and businesses. Many SIT graduates go on to do important work in engineering and construction in Seychelles, and SIT has embraced its responsibility to make sure its graduates are equipped with skills that meet the demands of the future workforce.

SIT instructors have played a major role in bringing about this shift toward innovation. With full institutional support, the staff at SIT are incorporating less-

traditional teaching methods into their instruction. This includes a greater emphasis on hands-on, practical experience outside the classroom and continuing education opportunities for teachers.

The result has been a forward-thinking approach to innovative TVET at SIT and a steady stream of graduates ready to tackle one of the country's most urgent environmental issues: its water supply.

A policy of innovation

SIT's transition to an innovative TVET approach began with fundamental changes by the institution's leadership and management. The SIT Strategic Plan 2019-2023 clearly emphasises SIT's role as an innovative TVET institution, and the recently created Research and Innovation Committee (RIC) is tasked with leading SIT's innovative efforts. Both the Strategic Plan and the RIC have given SIT firm footing when it comes to partnering or negotiating with external stakeholders on innovation projects at the national and international level. More importantly, these changes have created an atmosphere for SIT instructors to learn and implement new content and teaching methods into the curriculum.

“The green economy is a concept that is becoming more and more important on the Seychelles islands. Sustainable development and rainwater harvesting are the talks of the day.”

Source: SIT Department of Plumbing website; <http://www.sit.sc/departments-carpentry-and-joinery-and-plumbing.html>

Like many institutions, instruction at SIT has generally focused on traditional teaching methods such as lectures and handouts. However, thanks to a new communication policy at SIT that encourages teachers to share experiences relating to new teaching methods, the staff is increasingly implementing a more modern approach to instruction.

Site visits, on-the-job learning, and real-time problem solving have increased creativity, innovation, and constructiveness among students while also accelerating

the rate of learning. Students are also leading their own discussions on experiences gained during tasks and projects.

Networking through the SIT Academic Committee, which oversees teaching and learning, has encouraged an exchange of methods and best practices among instructors and increased the use of Information and Communication Technology (ICT) in research and lesson prep.

New educational opportunities for instructors have had a direct impact on the quality of the curriculum at SIT. Through partnerships with external stakeholders such as Sustainability for Seychelles (S4S) and the Indian Ocean Commission (IOC), staff have participated in supplemental training. One instructor took part in a rainwater harvesting seminar in Kenya thanks to a collaboration with S4S, and five lecturers received renewable energy training that focused on heating water using solar panels. This seminar was held on Reunion Island and sponsored by the IOC.

With a focus on water supply and sustainability issues, many of the on-site learning opportunities for students have been in the fields of plumbing and water conservation – areas that have been identified by NGOs, government institutions, and the private sector as key priorities for Seychelles.



SIT students became Seychelles Water Warriors and helped residents with plumbing issues as part of a collaboration with Sustainability for Seychelles. Photo: © SIT

Professional water warriors

The collaboration between SIT and a range of external stakeholders has been mutually beneficial: access to resources and opportunities for collaboration have directly benefitted SIT instructors and students, while the innovative practices implemented at SIT positively impact the public and private sector in Seychelles as SIT graduates become more involved in projects outside the institution.

One early partner was S4S and its Seychelles Water Warriors programme. The Water Warriors were SIT plumbing students who conducted on-site visits to private homes in local communities to fix leaky pipes. Other efforts included building rainwater collection tanks for



SIT “Water Warriors” in action. Photo: © SIT

private use or constructing a gabion barrage dam to reserve water for agricultural use during drought periods. S4S sponsored all tools and materials and benefitted from SIT as its main partner in implementing these projects.

Other stakeholders include the Seychelles Energy Commission (SEC) or the Public Utilities Corporation (PUC), a government parastatal responsible for the country’s electricity production. The SEC is looking into new policies regarding the import of energy-efficient appliances, while the PUC is looking to expand

the country’s dam capacity, water tank storage, and online payment options for utility bills. Not only do SIT students graduate with the technical and entrepreneurial skills to tackle these problems, but their hands-on work during their studies shows them that professional opportunities in these fields are available.

Moving to the driver’s seat

To date, SIT has relied on external partners such as S4S to take the financial and operation lead on collaborative projects. This has presented limitations – projects end once funding expires – but has also been a motivating factor as SIT looks to the future, where the institution sees itself taking the lead on projects.

With innovation firmly anchored in the SIT Strategic Plan 2019-2023, the SIT’s Innovation Action Plan has been clearly defined by its Research and Innovation Committee: four SIT-led innovation projects by 2023. The first is “Greening the SIT Campus,” an effort that will see students from different departments working together to install a system of rainwater collection tanks to provide water for workshops and toilet facilities.

By taking the lead on these projects, SIT also assumes financial responsibility and is working with the government to secure funding. Even without the direct financial support of NGOs on innovation projects, SIT remains open to joint efforts that benefit staff and students, while showcasing SIT’s position as an innovation hub.

Innovation performance of SIT



Source: SIT Innovation performance, based on the results of the Balanced Scorecard (23 August 2019)

Progressive Innovation and Entrepreneurship Education Model

Shenzhen Polytechnic (SZPT), China

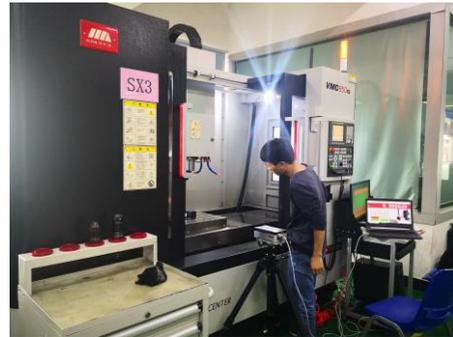
Shenzhen Polytechnic is one of China's largest and most renowned TVET institutions. The school's comprehensive and innovative approach to TVET on such a large scale has given its best practices national prominence.

Innovation on a grand scale

In recent years, Shenzhen Polytechnic (SZPT) has seen its reputation soar. In 2018, SZPT's 'practice of progressive entrepreneurship education' won first place in a national TVET achievement competition. In Guangdong province, where the institution is located, SZPT has been recognized as a 'demonstration college' for innovation and entrepreneurship education.

These are major distinctions in a country where the pace and scale of innovation are high, and competition is strong. SZPT has built its reputation on a wide-range of programmes, initiatives, student opportunities, and partnerships. Everything is based on a campus that includes a pioneering technology research and development centre for micro-businesses and SMEs, a global innovation and entrepreneurship education centre for technical and skilled talents, and support for innovative talents and entrepreneurs.

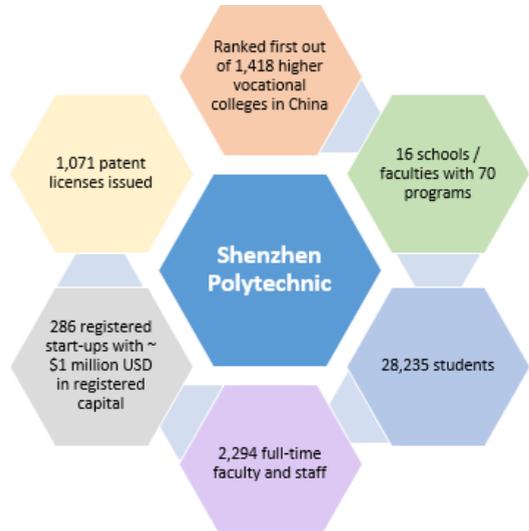
In other words, SZPT creates a learning environment that immerses students in the concepts and principles of innovation and entrepreneurship. The result is an institution that sets the pace of TVET in China.



Top-notch facilities and equipment are just one part of what makes SZPT a cutting-edge TVET institution in China Photo © SZPT

Innovating campus culture

Interestingly, in a field such as TVET where hard skills and specific professional qualifications are often the focus, one of the keys to success at SZPT has been cultural. An atmosphere of innovation and entrepreneurship surrounds students from day one. Weekly activities and projects for each student and monthly themed activities are part of this. More than 12,900 students are active in 206 club that focus on innovation. These clubs often take the lead on campus-wide events, such as business plan and technology innovation competitions and the "Maker Experience Month for Freshmen."



Shenzhen Polytechnic's size advantage. Source: SZPT

The innovative culture takes root in physical spaces for innovation and entrepreneurship on the SZPT campus. The College Student Creative and Entrepreneurship Park exists for students to work on start-up projects, and the micro-fabrication centre (known as the Maker Center) features free open source design tools, advanced manufacturing equipment such as a 3D printer, shared collaborative platforms, and training by representatives from well-known companies such as IngDan, Tencent, TCL, and Fenda.

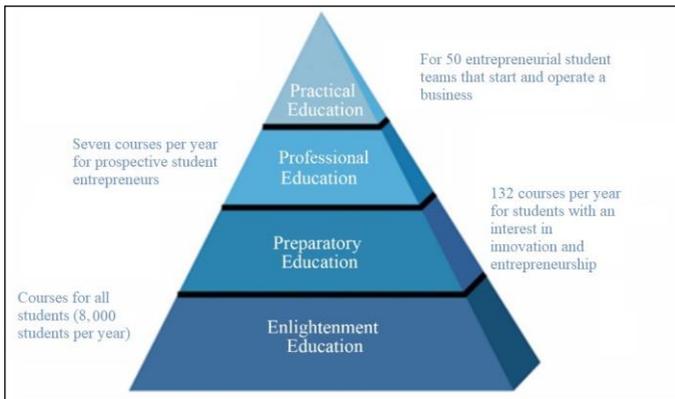
From 2010 through the middle of 2018, the Entrepreneurship Park produced 286 companies in a range of sectors, from hardware development to life services. State-of-the-art technology is standard on the campus, which features 5G connectivity. This comes as no surprise: SZPT has jointly established schools with leading enterprises, including the Huawei School of Network Technology.

SZPT's culture of innovation and its cutting-edge facilities set the stage for the school's true distinction as a TVET leader: a systematic, college-wide shift in teaching and learning that covers digitalization, entrepreneurship, and greening practices, organised and operated with sector leaders and key businesses.

Embedding innovation and entrepreneurship in the curriculum

SZPT's approach is based on a standardised curriculum that ensures a core set of successive courses – categorised as either innovative or entrepreneurial – is included in every course of study. Courses dealing with innovation seek to teach students about innovative thinking, innovative methods, and technology research and development for maker projects. Entrepreneurial lessons introduce the basic concepts and principles of entrepreneurship, including methods and skills for starting a business.

These lessons successively build in terms of specificity and depth based on another SZPT standard approach, a hierarchical and multi-dimensional "four-in-one" education curriculum system. It begins with an 'enlightenment' phase, in which students are exposed to the most basic principles of innovation and entrepreneurship. Preparatory courses are next and include electives in 50 innovation and entrepreneurial subjects. This is followed by professional and vocational courses in seven specialised innovation and entrepreneurship subjects. The final step – practical education – takes student entrepreneurship projects and moves them into the incubation phase at the school's Entrepreneurship Park.



Shenzhen Polytechnic's "Four-in-One" Curriculum System for Innovation and Entrepreneurship Education. Source: SZPT

A final curricular innovation at SZPT is known as the "major+" reform. This is a model of "core majors + extended majors" to encourage interdisciplinary approaches to learning and courses of study that better integrate traditional majors with TVET skills. In addition to highlighting innovation and entrepreneurial training, the major+ approach creates new opportunities for students and TVET institutions to work

closely together with stakeholders from the private sector – another area where SZPT flourishes.

One example is SZPT's 600-member team of entrepreneurship education instructors that includes subject experts, famous entrepreneurs, alumni, professional teachers, and counsellors.

A crowning achievement for SZPT came in 2018, when the Chinese Ministry of Education approved a national innovation and entrepreneurship education resource library project. The initiative was led by SZPT and jointly developed with ten well-known companies, such as Oracle and Alibaba, and 33 additional renowned TVET institutions in China.

The goal is to create an educational ecosystem for innovation and entrepreneurship in which TVET institutions, industries, enterprises, and social learners interact. So far, the platform has nearly 18,000 items of material, 58,000 registered students, and 938 micro-lectures. It covers 34 provincial-level administrative regions and is used by more than 800 colleges and universities with a total of more than 8 million visits.

By setting up an open ecosystem for innovation and entrepreneurial resources, the best practices of a leading institution like SZPT can be easily disseminated and adopted by other schools to provide students with top-notch innovation and entrepreneurial training.

A TVET innovation role model

While many other TVET institutions will not be able to replicate SZPT's scale or resources, the school's culture, dedicated spaces for innovation and entrepreneurship, and educational approach to introducing innovation and entrepreneurship represent an array of best practices.

Simply tapping into SZPT's vast resources through the education resource library represents a step forward for students and other institutions when it comes to innovation in TVET.

Innovation performance of Shenzhen Polytechnic



Source: SZPT, Innovation performance based on the results of the Balanced scorecard (6 September 2019)

OSKE Skills Centre for Migrants

OMNIA - The Joint Authority of Education in the Espoo Region, Finland

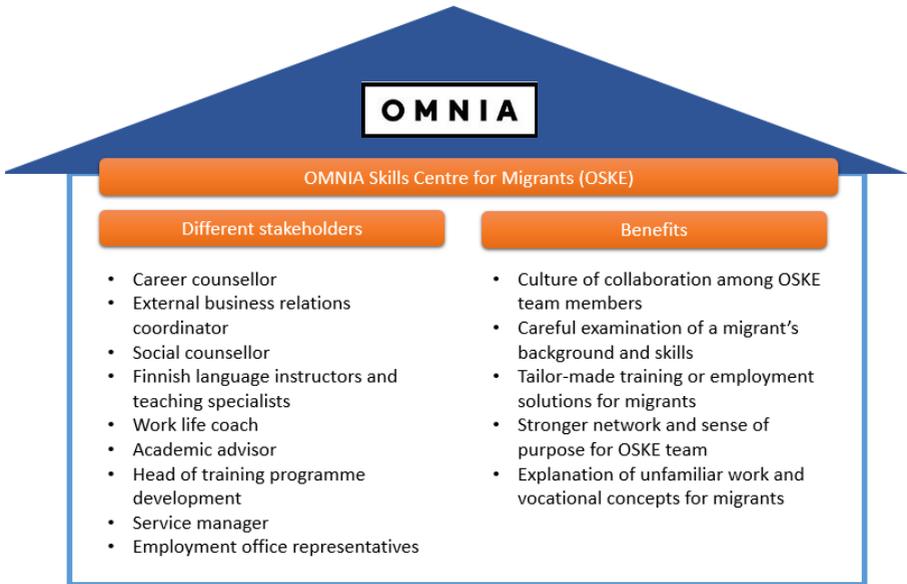
The path toward employment and integration in a new society is often long and winding for migrants. Rather than continue with integration policies that can be frustratingly slow for all stakeholders, one of Finland's regional TVET centres is testing a new approach.

Finland's 'one-stop shop' for migrant services

Like many European countries in recent years, Finland has seen its population of migrant residents increase. This is especially true in the region around the city of Espoo: one estimate says that the migrant proportion of the population in Espoo will reach 30 percent by 2035. Statistics also show that the unemployment rate among migrants is currently around 2.5 percent higher than native Finns. Given these figures, the Finnish government has made it a priority to shorten the path to employment for migrants. The city of Espoo's strategy states that the level of education for migrants needs to be increased and the path to societal integration and working life needs to be quicker and more flexible.

In short, Finland – and the Espoo region in particular – are interested in putting migrants on the fast-track to joining the labour market. Unfortunately, this is where Finland runs into a problem familiar to other European countries facing the same issue: a lack of centralised services, such as the employment office, vocational training centres, or social support. This makes progress difficult for migrants, leading to a self-fulfilling cycle of marginalisation.

This is where OMNIA, a multisector TVET provider and regional development centre, enters the picture. OMNIA enjoys a good reputation and working relationship with



Finnish TVET institution OMNIA brings services for migrants under one roof

regional authorities. It has experience in programmes specifically targeting migrants, and maintains close ties to regional businesses.

This made OMNIA the perfect choice for bringing a team of various professionals, counsellors, and public authorities under one roof to better serve migrants and introduce them to the labour market in a quicker, more efficient way. The result is Osaamiskeskus (OSKE), OMNIA's Skills Centre for Migrants, which represents an innovative approach to migrant integration and creating a sustainable workforce led by a traditional TVET institution.

Common cause in a shared environment

OSKE functions as a one-stop shop for migrants seeking employment or vocational education. The concept is simple: if a migrant over the age of 17 with a residence permit to live in the Espoo region is registered at the employment office but cannot find work, he or she can be referred to OSKE. There, migrants can meet with a career supervisor and plan a path toward employment or vocational training. National and

regional interest in the matter is also straightforward: shorten the path to employment and accelerate integration for migrants.

Implementing this concept, however, required innovative leadership and organizational practises at OMNIA. OKSE required coordinating a diverse team that pursued a common purpose. Career counsellors, external business relations coordinators, a social counsellor, Finnish language instructors and teaching specialists, a work life coach, an academic advisor, a training programme development lead, a service manager, and representatives from the employment office – each with different institutional mandates and areas of expertise – were tasked with preventing social exclusion, providing services for migrants, and ensuring that these migrants either possessed or learned skills most relevant to regional employers.

The first step for OMNIA was to create a common set of rules and goals that would guide OKSE's work. Given the wide range of services and institutions involved, this was not a guaranteed success at the outset, but one early and practical victory was the simple matter of bringing all institutional stakeholders under one roof and creating a shared working environment at OMNIA.

Bringing so many public institutions and authorities together might seem like the recipe for a bureaucratic headache, but OSKE has ensured that project management and oversight is integrated into existing systems in a steering group. This includes one OMNIA staffer tasked with making sure cooperation runs smoothly and the concept is continually optimised. VTT, a research, development, and innovation partner with a mandate from the Ministry of Employment and the Economy, uses tools to assess the effectiveness of the procedures, while the Ministry of Labour, the Ministry of Education and Culture, and the Ministry of Economic Affairs and Employment also help keep the big picture goals at the forefront of OSKE's work.

Keeping the 'customer' in mind

OSKE has been up and running for about one year and has so far seen around 400 migrants utilise its services. Nearly 40 percent have been between 30 and 39 years old. A few have pursued work opportunities, but the majority have opted to either enhance existing vocational skills or learn new ones.

In this regard, OSKE's proximity to OMNIA is beneficial. As a multifunctional vocational education provider, OMNIA has a large variety of vocational fields and qualifications for migrants to explore. Migrants can begin at a lower level with

general vocational qualifications or preparatory studies, work on Finnish language skills in the meantime, and then move on to more advanced vocational training in a specific field.

Across the entire range of OMNIA's vocational education programmes, the school's counsellors try to understand and recognize migrants' prior knowledge and skills during assessments. For some, this means they can pick up where they left off in terms of their previous vocational development. However, for others, it represents an opportunity to examine their background and personal history. If migrants have experienced psychological trauma, have a learning disability, or lack a basic education, the OSKE team can address these problems at a slower pace and find solutions that are tailor-made to each person's situation. This strengthens identity and self-confidence, important steps in creating a sustainable workforce that are not common in Finland and represent another important leadership innovation at OMNIA.

The system is promising because it emphasises the needs of the migrant by establishing good "customer service." In fact, the "customer journey" is quite linear and straightforward: migrants are referred to OSKE from the employment office, receive tailor-made services, and finally leave OSKE for vocational training or a job. Eliminating or minimising the typical bureaucratic or institutional hurdles is what makes this approach so effective.



Photo ©
OMNIA

A model for cutting red tape

By focusing on a “customer-oriented” approach and ease of access, OSKE has managed to streamline many elements of the complex journey a migrant might otherwise face on the path toward integration and work in a new country. Institutions and public authorities also find a way to help migrants who might otherwise get “stuck in the system.”

OSKE’s approach seems straightforward, yet many countries and communities still struggle to streamline the process of integrating migrants into a society. By selecting a leading TVET institution like OMNIA to lead the OSKE effort, Finland and the Espoo region have found an effective partner for creating a process that shortens the path to employment for migrants and helps those that might otherwise struggle to find their footing. Evaluation of the pilot project is ongoing, but the promising initial results could soon be applied to other cities in Finland or outside of the country.

Innovation performance of OMNIA



Source: OMNIA, Innovation performance based on the results of the Balanced scorecard (13 September 2019)

Culture of Innovation

TKNIKA, Basque Country, Spain

Many innovations highlighted in the UNESCO-UNEVOC Skills for Innovation Hubs initiative come from individual TVET centres. But in the Basque Country, one institution is leading efforts to bundle individual projects and innovate the region's entire TVET sector.

The bird's eye view of TVET in the Basque Country

For an institution that focuses on innovation in TVET, Tknika is a bit unusual: it employs teachers, but has no classrooms. It focuses on teaching students, yet has never graduated any.

This is because Tknika is no ordinary TVET institution. Rather than adopting a traditional TVET role and directly teaching the skills that are needed on the labour market, Tknika's mandate is to facilitate improvements in instruction, learning, and innovation among all TVET stakeholders in the Basque Country. Tknika serves as the ihub of ihubs, setting projects and initiatives in motion and making sure that new developments in policy, the private sector, and civil society are quickly embraced by TVET institutions and incorporated into teaching and learning.

Short paths to innovation

Tknika came into being in 2005. Officials from the Vice-Ministry of Vocational Training observed that TVET centres in the Basque Country were working toward different aims in pursuing various innovative projects. Opportunities for synergy and mutual learning were being missed, and Tknika was created to facilitate a better system for sharing knowledge and mainstreaming new projects and ideas.

In this sense, Tknika can be seen as the Basque Country's TVET 'first responders,' reacting quickly to new developments, emerging trends, promising innovations, or policy shifts at all levels, from regional to European.

Tknika's vigilance in monitoring the TVET landscape is led by its full-time staff, which ensures that projects most relevant and innovative for TVET institutions are identified, developed, and disseminated. However, Tknika does not work in isolation: its work would not be possible without direct participation by collaborators from regional TVET centres.

As innovative initiatives take shape – a process that lasts from a few months to more than an academic year – a rotating group of collaborators divides their time between teaching in TVET centres and work on Tknika projects. This facilitates 'front-line' knowledge transfer: collaborators can immediately implement new innovations crafted at Tknika, and Tknika receives rapid feedback as projects are tested in TVET centres.

All innovative projects include dissemination actions, such as didactic materials, training for students or teachers, new findings that might benefit the private sector, or potential opportunities for companies or other intuitions. The point is to minimise the period between the introduction of new developments in technology or vocational skills, and the point when Basque society and industry can start benefitting.

This makes the business sector in the Basque Country an invested stakeholder at Tknika, one that is actively involved in shaping Tknika programmes and innovations.

One example is a method of teaching that utilises challenge-based learning. It is called ETHAZI – high performance cycles. The challenges are designed by collaborators at Tknika or business sector representatives. They aim to teach students certain skills in a real-life setting. Students break with the classic classroom approach within pre-defined subjects and must apply multidisciplinary knowledge to solve problems. The way



Printing prosthetic limbs using 3D printing is just one of many projects Tknika helps implement at TVET centres in the Basque Country. Photo: © Tknika

in which these challenges are created emphasises the use of ‘soft skills’ such as creativity, teamwork, autonomy, and information management to solve them. These are important skills applicable to any sector of the workforce.

Hard skills also factor into Tknika projects. One example – and there are many – is the IkaSlab project, which originated at the High-Level Vocational Training Institute Don Bosco in the Basque Country. Don Bosco acquired a 3D printer in 2010 and began training its staff and students on its use.

In 2018/19, around 2,800 hours of formal training, training for employment, training for companies, and teacher training were invested in 46 Tknika projects involving nearly 2,900 teachers.

After recognizing this innovation at one of its centres in the TVET network and noting the increased use of 3D printing in a variety of sectors, Tknika got to work on helping a total of 16 TVET centres start 3D printing labs. This involved investment, resources, and vigilance by

Tknika, and the acquisition of skills, new methodologies, and transfer actions by staff and students at the hubs. More teachers, students, and – eventually – businesses stood to benefit, thanks to Tknika’s position in the middle of an ecosystem of network contacts, best practices, and TVET centres.

There was even a direct benefit for the public: The Don Bosco TVET Centre became involved with an international charity effort and began producing prosthetic limbs for underprivileged people using the 3D printer. Since any lab with a 3D printer can do the same, Tknika leveraged the ‘Printing Smiles’ programme and helped bring it to other Basque TVET centres.

Setting standards

Tknika is so effective at identifying and disseminating new TVET innovations among its network because it follows a methodical approach and has clearly defined its role and mandate.

At an institutional level, Tknika coordinates the Applied Research and Innovation System of the Basque Vocational Training based on the fifth version (published in 2019) of the Vice-Ministry’s Vocational Training Plan. This sets out the strategy for all vocational training centres in the Basque Country – whether public, semi-public, or

subsidised – and is supported by regional employment goals, gender equality efforts, and the Sustainable Development Goals.

Next, Tknika created a framework to define the goals of its innovations. In addition to objectives, this framework creates criteria for deciding which projects are pursued, who takes the lead, and the pathways for broader dissemination. The framework includes:

- **TVET Network Hubs** that share themes and objectives aimed at aligning TVET instruction with the needs of industry. Currently, 19 TVET centres are involved in four operative hubs: biosciences, advanced manufacturing, digital and connected factories, and energy.
- **Centre Projects** that utilize the specific strengths and areas of expertise at individual TVET centres. These bottom-up projects are quite diverse in nature but find common ground at Tknika, which helps facilitate mainstreaming and knowledge transfer.
- **Tknika Areas of Specialization**, which are Tknika-initiated projects that seek to respond to current or future industry demands by creating knowledge in strategic areas still considered up-and-coming at TVET centres.
- **Tkgune, or Strategic Environments**, which are collaborations between vocational training centres and companies, SMEs, and micro-SMEs. The main goal is transferring knowledge gained in these collaborations to the rest of the network.

Within this framework, each programme has an established system of selection, monitoring (indicators, deadlines, results), and knowledge transfer to the greater TVET network. By routing everything through Tknika and adhering to its methodology, stakeholders know that these projects will:

- Generate training actions
- Lead to collaborations with society, companies, and institutions
- Facilitate employability by developing the skills of future workers
- Provide the necessary knowledge and support to those who want to start a business

Creating the right culture

Although Tknika has existed for well over a decade, it continues to look for ways to expand the culture of innovation that it helped create in the Basque Country. Among its goals for the near future is an effort to align regional strategies and policies on innovation with Smart Specialisation Strategies launched by regional governments.

Tknika also hopes to help professionalise the innovation process among its stakeholders by increasing technological awareness, defining stakeholder roles, identifying a portfolio of projects, scaling these projects beyond the Basque region, and creating materials – such as manuals, training activities, videos, and conferences – for transferring the results of their innovations.

Considering these steps is only possible in an environment that is accustomed to innovating and working together, with close contact among stakeholders. This is one of Tknika's biggest successes, and their participation in the i-hubs initiative shows they are still as vigilant as ever in remaining at the forefront of TVET innovation.

Innovation performance of TKNIKA



Source: TKNIKA, Innovation performance based on the results of the Balanced scorecard (20 September 2019)

Business Innovation Centre

TESDA Women's Center (TWC), Philippines

The TESDA Women's Center in the Philippines has always been a hub of entrepreneurial learning and empowerment for marginalised women. Now, by working with a committed industry partner and investing in new facilities for innovation, TWC graduates are baking and brewing their way toward modern entrepreneurship.



Piping hot coffee by future Filipino entrepreneurs. Photo © TWC

Innovating Fermentation, percolation, and incubation

The campus of the Philippines' Technical Education and Skills Development Authority (TESDA) is located in the city of Taguig near the capital, Manila. In addition to TESDA's central offices, the location is home to the TESDA language skills institute, the TESDA Women's Center (TWC), and several other institutions and local businesses.

Hundreds of students, administrators, instructors, guests, and local workers pass through the campus every day, often stopping at TESDA's Café Juana. Even with expert baristas brewing excellent coffee, paired with irresistible pastries, Café Juana would normally be an unremarkable fixture on campus. But at TESDA, the cafe represents much more than just a coffee break: it stands for entrepreneurship, the empowerment of women



Bread and pastries made by TWC students. Photo © TWC

through TWC, a successful public-private educational collaboration, and TVET innovation.

Café Juana – and the Wooden Spoon training workshop for bread and pastry production next door – are part of TWC’s latest efforts to improve entrepreneurial training by including 21st century skills in the curriculum and providing graduates with guidance and facilities to launch their own businesses.

A recipe for innovation

TWC has a range of vocational education programmes, many of which are designed for the tourism sector. These include national certifications (NCs) in barista training and bread / pastry production – the two programmes that are the focus of TWC’s innovative practice known as the Business Incubation Center (BIC).

The BIC represents completely new concepts, facilities, and opportunities for graduates of the Barista NC II or Bread and Pastry NC II programmes. It came together partly by happenstance, but also due to TWC’s close ties to industry partners.

After TESDA completed planned renovations to one of its buildings on campus, TWC realised it would be the perfect location for the BIC. At the same time, the Pilmico Foods Corporation recognized an opportunity to get involved with TWC students and help teach them the latest technologies and techniques in baking. A memorandum of understanding was signed, and the “Incubation Kitchen” was born.

Thanks to financial contributions from Pilmico’s parent company – a large national flour producer called Aboitiz Equity Ventures – the BIC included provisions for a studio kitchen, lecture and demonstration areas, a walk-in bakeshop, and food stalls for processed desserts and bread accompaniments. The on-site facility is called Wooden Spoon, named after Pilmico’s flagship flour brand that forms the main ingredient in the baked products made by the trainees.

Pilmico was also closely involved in working with TWC to develop the curriculum for the Bread and Pastry Production NC II programme, which had not previously been offered at TWC. While the curriculum will contain models on business start-up

principles such as bookkeeping, customer satisfaction, and marketing, it will also include learning activities designed to develop 21st century skills, including critical thinking, problem solving, innovativeness, environmental literacy, information technology, and gender sensitivity training, with an emphasis on gender issues in entrepreneurship.

Although the focus of the BIC was initially on the Bread and Pastry Production NC II programme, a TWC feasibility study concluded that Café Juana could serve as a companion site in the same building for Barista NC II graduates. Equilibrium Intertrade, a coffee distributor in the Philippines, teamed up with TWC and provided free opportunities for training and exposure to emerging technologies and trends in the coffee industry.

The new facilities opened in 2019, and TWC has now entered the second and most decisive phase of the BIC: opportunities for graduates of Bread and Pastry Production NC II and Barista NC II to apply for services and guidance as would-be entrepreneurs.

Fully-baked business plans

Starting in 2019, the very first group of Bread and Pastry Production NC II graduates and the next set of graduates from the Barista NC II programme have been encouraged to prepare detailed business plans and apply for admission to the BIC. With limited capacity in terms of space, equipment, and financial resources, the TWC will select the most-promising business plans for the BIC.

“Given the chance to have access to the BIC resources, it would be an exciting opportunity to master the baking and entrepreneurial skills and eventually help in putting up our own business.”

Maureen Rose E. Talorete, Bread and Pastry Production NC II graduate, who specialises in twists on Filipino pandesal bread and Spanish churros

Once accepted, the recent graduates have access to a variety of services that will help their businesses get off the ground. These include:

- Seed capital for initial operations
- Coaching / mentoring on business basics and etiquette
- Networking connections
- Marketing assistance and market research
- Help with accounting / financial management
- Technology commercialisation assistance
- Help with regulatory compliance

The TWC Alumni Association has also gotten involved by providing microloans to the up-and-coming entrepreneurs.

Even after graduates have been accepted into the BIC and are on their way to realising their business goals, they continue to benefit from close association to TWC and the school's industry partners.

The Philippines' Department of Trade and Industry provides free Entrepreneurship Training. This benefits TWC instructors by keeping them up to speed on the latest trends and also students still pursuing their Bread and Pastry Production NC II or Barista NC II.

Pilmico and Aboitiz remain involved as the main supplier of flour and other supplies at the BIC and by providing specialised workshops to enhance the skills of the graduates and trainees with new technologies and techniques in baking. This establishes a working relationship between Pilmico and the young entrepreneurs, which could continue as the new businesses move beyond the TWC BIC.

Unfiltered ambition

With the first group of TWC graduates currently taking part in the programme, the BIC is still in the early stages of its existence. However, TWC's Innovative Practice has already been successful in providing the school's students – predominantly women from marginalised areas of society – with knowledge, skills, and attitudes that will help them become empowered and capable members of the workforce, either as entrepreneurs or as wage earners.

By including 21st century skills into the new Bakery and Pastry Production NC II curriculum, issues such as gender and development or sustainability are becoming a

matter of course in entrepreneurial training, rather than an afterthought. Sustainable practices such as reusable straws or using coffee grounds to fertilise the TWC garden go without saying at Café Juana.

Looking forward, TWC's innovation action plan recognizes the need to attract more partners to the BIC. Not only does this ensure the BIC's financial future and secure ongoing opportunities for graduates, but by attracting a diverse group of external stakeholders, the scope of the BIC can potentially be expanded to include other fields and disciplines.

TWC has always strived for excellence as a TVET institution, and its innovative collaboration on the BIC between the institution, partner industries, and graduates was designed to bring about a new era in empowering Filipino women.

Innovation performance of TWC



Source: TWC, Innovation performance based on the results of the Balanced scorecard (27 September 2019)

Bridging the gap between applied research and the market

Yaba College of Technology (YCT), Nigeria

The Yaba College of Technology in Nigeria has developed a knack for connecting its researchers and students to projects that address real-world problems, encouraging creativity and innovation, and fostering long-term relationships with external stakeholders.

The power of mushrooms and Coca-Cola bottles

One of the main goals at Nigeria's Yaba College of Technology (YCT) in Lagos is to utilise the school's strengths as a TVET institution to meet the needs of the community and to help solve some of the most pressing issues in Lagos and Nigeria. These include better food security, reducing the unemployment rate, and lowering environmental pollution.

Since the introduction of the YCT Applied Research and Technology Innovation (ARTI) centre in 2006, demand-driven research has guided a curriculum and set of projects that provide students with professional training, anchored in real-life problem-solving situations. YCT also encourages an entrepreneurial spirit, which can help students put their own ideas to work as a means of earning a living.

By investing more than \$5.5 million USD over the last decade, YCT has made a commitment to research and development. This includes training and facilities like the school's central research lab with its full



Mushrooms were once uncommon in Nigeria, but YCT research helped establish them as a food crop. Photo © YCT

chemical engineering setup, or the centre for computer-based tests. YCT also encourages students to apply for research grants and other sources of funding and provides institutional support during the application process. Within this environment, YCT researchers and students have worked on research projects, products, and services that directly impact markets and gain wide acceptance.

Mushrooming research projects

One of the earliest successes of YCT's ARTI was a project that began with four students from the department of biological sciences. In 2011, a World Bank innovation initiative awarded YCT a grant that covered a wide range of agricultural projects, including an effort to identify and domesticate an indigenous edible mushroom for the Nigerian market. This particular element of the project would turn out to have a wide-reaching positive impact on the entire country.

Initially, a lack of skilled farmers and mushroom supply meant the local species was not being sold in Nigeria and residents were not benefitting from the nutritional and health benefits of mushrooms. Now, two species are being cultivated for consumption and YCT is still producing and selling spawn bottles for farmers to use.

Mushrooms became a crop recognized by the Federal Ministry of Industry, Trade and Investment and were important enough that a National Mushroom Association of Nigeria was created. One estimate from the association's president said that mushroom cultivation had the potential to create 50,000 jobs in Nigeria. This included opportunities in the medical industry, and an additional grant led to domestic cultivation of a species of medical mushroom. Research confirmed its positive effect on breast cancer cells.



Results of the YCT Mushroom cultivation and research project 2012-2019. Source: YCT



Upcycling challenges students to find a path from 'waste to wealth.' Photo © YCT

The project highlights how the basic principle of YCT's Innovative Practice works: external stakeholders offer support for institutional research to solve a problem or achieve a goal. In this case, the initial research was conducted as part of the World Bank's efforts to increase science and technical education at post-basic (STEP-B) levels in Nigeria. The medical research was funded by a Lagos State Research and Development Grant in line with the state's 'PATH' Policy (Power, Agriculture, Transport, and Housing) on development goals.

YCT looks for potential projects that are in line with Nigeria's focus on the Sustainable Development Goals – increasing skills for employment among youth and adults, and reducing waste generation – and encourages researchers and students to apply. Once the projects have been approved, students are free to apply skills they have learned in research methodology and in development growth entrepreneurship.

Many of YCT's research projects address solutions and advancing technology for sustainable development – in the mushroom project alone, sustainability benefits included the introduction of mushrooms as a food crop in Nigeria and evidence that mushroom cultivation has a positive impact in the bioremediation process of polluted soil.

A commitment to sustainable development is embedded in YCT's Strategic Plan 2018-2023, but it does not always involve purely scientific endeavours. The concept up upcycling has many applications in sustainable development, but at YCT, such projects straddle the line between technical innovations and art. For example, the Nigerian Bottling Company Limited commissioned YCT's School of Arts Design and Printing to promote a competition for the best art projects using recycled, glass Coca-Cola bottles. The company hoped the 6: one design for a bus shelter made of recycled bottles demonstrated how upcycling could address practical, everyday needs of a community.

Since the bottle project, students regularly create upcycling projects in the course of their studies. This has led to further curricular developments: the use of discarded

items has been incorporated into a course on methods and materials. Upcycled student art is on display across the campus, and some pieces have even generated income for YCT.

Collaborative problem solving

In providing clients with high-quality research and creativity services, YCT is serving two sets of stakeholders at the same time: students are given opportunities to learn, create, and apply their skills to real-world problems, while companies and organizations receive the support of competent researchers and innovators in coming up with new solutions.

The nature of the work means students, researchers, and the school's clients work closely together. Industry partners enable students to utilise Nigeria's Student Industrial Work Experience Scheme (SIWES) and other work-based learning opportunities, while YCT teachers can go on exchange programmes.

The mushroom project has led to several additional collaborations with research institutes and government authorities, while the art projects facilitate working relationships between companies like the Nigerian Bottling Company or Dufil Prima Foods – another sponsor of an art competition.

The exchange also works in the other direction: ARTI works with the College Research Committee to host a quarterly lecture series on market-driven research; guest speakers include CEOs and directors from partner businesses. YCT has several agreements in place with industry partners and external organizations that inform market-driven research and prototypes, which can be patented and commercialised to the benefit of the college. In fact, Nigeria's office for registering intellectual property rights and patenting innovations has an office in the ARTI centre to assist in patenting the college's innovations.

New opportunities

The college's experience has shown that individual projects often continue and lead to new innovations, discoveries, and research opportunities. YCT is always looking for ways to maintain the momentum of these projects by scaling production and reaching new audiences. One example includes the commercialisation of mushroom

juice, which involves finding food industry partners and investors. The college is also looking for new industry partners for its sustainable energy and environmental solutions.

Whether it is technical innovations in mushroom cultivation or finding innovative ways to make products and art using upcycling, YCT is committed to creating a TVET environment of discovery and innovation for its students. With its Strategy 2018-2023, these efforts are focused on new horizons: sustainability, opportunities for growth and diversification, and creating career-ready graduates with hands-on experience in their trade.

Innovation performance of YCT



Source: YCT, Innovation performance based on the results of the Balanced Scorecard (25 October 2019)

