

## TOOLBOX: Improving engineering graduates' employability

### The challenge

A key challenge for graduate engineers in sub-Saharan Africa (SSA) **is to successfully transition into the workforce.** This can be difficult due to a lack of good-quality education, a lack of opportunities for gaining practical experience, and relatively low pay for newly-qualified engineers. The length of compulsory training also decreases the attractiveness of the profession (for example, compulsory training in Kenya is three years). This can lead the best engineering graduates to seek employment in other countries or fields.

### Initiatives

Professional engineering institutions (PEIs) in SSA have been active in improving CPD. They have introduced professional registration renewal requirements, hosted seminars and training events, published regulatory manuals, and facilitated professional development within academia.

#### Graduate placements

PEIs set up schemes providing graduate engineers with practical work experience in industry

**Outcomes:** graduates gain confidence, new skills and experience, improved employability, and the chance to be offered a permanent position upon completion

**PEIs:** Institution of Engineers Rwanda, Engineers Registration Board, Uganda Institution of Professional Engineers, Institution of Engineers Kenya, Nigerian Institute of Electrical and Electronic Engineers, Sierra Leone Institution of Engineers

#### Competitions

PEIs organise competitions for students to develop practical engineering solutions

**Outcomes:** graduates gain practical experience, build professional networks, and learn new skills

**PEIs:** Nigerian Institution of Mechanical Engineers, Zimbabwe Institution of Engineers, Institutions of Engineers Rwanda, Institution of Engineering and Technology

#### Mentorship

PEIs facilitate mentorship between engineering professionals and students or recent graduates

**Outcomes:** students (especially underrepresented groups such as women) are inspired to pursue engineering careers

**PEIs:** Sierra Leone Institution of Engineers, Nigerian Institution of Mechanical Engineers

#### Online education

PEIs offer certified digital courses

**Outcomes:** bridge the gap between the education system and the needs of the industry, and facilitate remote learning

**PEIs:** Nigerian Institution of Mechanical Engineers


### Case study: The Solar Power Programme of the Nigerian Institute of Electrical and Electronic Engineers (NIEEE)

Sponsored by the global network of the Institute of Electrical and Electronics Engineers, NIEEE's Solar Power Programme was launched in 2018 to address the fact that **many rural communities were off the grid**, and **many young engineering graduates were unemployed.** Putting these two issues together, NIEEE designed the programme to provide graduates with training in solar power, and offered them local materials to build solar lamps. As a result, 2,000 young people were trained and gained certification. The programme helped to address **30% of the power challenges** in Nigeria's camps for internally displaced people. This has greatly improved inhabitants' standard of living, and has created opportunities for entrepreneurship through the sale of the solar lamps and fans.

## Success factors and achievements

For each category of interventions, the table below identifies the implementation challenges and the success factors for these interventions. The table also highlights some of the strongest achievements.

Interventions	Challenges	Success factors	Examples and achievements
<p><b>Graduate placements</b></p> 	<ul style="list-style-type: none"> <li>→ Limited demand for recent graduates</li> <li>→ Challenging to attract female participants</li> <li>→ Difficult to attract buy-in from employers because graduate placements are not common in SSA</li> </ul>	<ul style="list-style-type: none"> <li>→ Building partnerships with large companies that can offer several traineeship positions every year</li> <li>→ Providing graduate students with a stipend to save labour costs and make placements more attractive for employers</li> <li>→ Targeting underrepresented groups within the engineering industry</li> <li>→ Identifying areas within the sector which are underdeveloped and understaffed</li> </ul>	<ul style="list-style-type: none"> <li>→ <b>Rwanda – Institution of Engineers Rwanda (IER): <a href="#">Bridging the Gap traineeship programme</a></b> IER has partnered with large companies to <b>secure two or three traineeship positions</b> for its graduate members. IER also matches experienced engineers with young professionals so that the former can train the latter. The first roll-out of the programme in 2017 involved <b>60 interns across eight projects</b> in different provinces of Rwanda. Some participants were retained on a contract basis, and two-thirds of the interns found jobs within the sector.</li> <li>→ <b>Tanzania – Engineers Registration Board (ERB): <a href="#">Structured Engineers Apprenticeship Programme</a></b> ERB supervises this programme launched by the Ministry of Works in 2003, and subsequently funded by the Norwegian government. It <b>supports inexperienced women graduates to qualify for registration</b> as professional engineers. As of result, the proportion of female engineers in Tanzania has more than doubled, from 4% to 9% and the programme had already recruited <b>more than 400 trainees</b>, as of 2018 all of whom have received practical training in the industry.</li> </ul>
<p><b>Graduate placements</b></p> 			<ul style="list-style-type: none"> <li>→ <b>Uganda – Uganda Institution of Professional Engineers (UIPE): Graduate Training Programme</b> The Graduate Training Programme matches unemployed recent graduates with <b>placements in engineering organisations</b>. The programme aims to bridge the gap between education and industry. It also enables graduates to acquire the necessary experience and skills to qualify for corporate membership with UIPE and to register with Engineers Registration Board.</li> <li>→ <b>Kenya, Engineers Board Kenya (EBK): <a href="#">Graduate Engineering Internship Programme (GEIP)</a></b> The GEIP runs for 24 months and sees <b>interns trained under professional engineers</b> who are registered by EBK. This structured programme gave graduates hands-on experience and mentoring to prepare them for professional practice in their respective fields.</li> <li>→ <b>Nigeria – Nigerian Institute of Electrical and Electronic Engineers: Training young people in solar power programme</b> See case study on page 2</li> </ul>

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<p><b>Competitions</b></p> 	<p>→ It can be difficult to attract the interest of students for various reasons such as the necessary time commitment and travel costs</p>	<p>→ Inviting diverse attendees from across the sector to facilitate networking</p> <p>→ Offering students additional incentives to participate (for example, the chance to participate in an internship)</p> <p>→ Gaining media exposure for events to increase interest from both students and industry stakeholders</p>	<p>→ <b>Nigeria and Ghana – Nigerian Institution of Mechanical Engineers (NIMechE): Innovation Challenge</b></p> <p>NIMechE has launched two Innovation Challenge competitions. The most recent one took place in 2018 and attracted <b>320 students</b> from Nigeria and Ghana. The competition aimed to encourage students to <b>develop innovative solutions in different aspects of engineering</b>, such as agriculture and healthcare. Participants also gained the opportunity to do an internship provided by NIMechE’s network of companies. As a result, students gained wider professional networks, and improved their leadership and entrepreneurial skills.</p> <p>→ <b>Zimbabwe – Zimbabwe Institution of Engineers (ZIE): Engineering competitions</b></p> <p>In 2014, ZIE created the National Engineering Students Awards Competition (NESAC), a yearly nationwide competition that draws Zimbabwe’s brightest undergraduate engineering students together to showcase their technical, communication and innovation skills. In advance of the competition, each participating university holds a preliminary round, finally fielding two candidates for the national competition. Students develop an engineering solution to deliver sustainable clean water, access to health services and improved agricultural practices, among other things, including via ICT and innovative technological solutions. The aim is to promote innovation and the commercialisation of students’ projects. Winners receive a trophy and a financial prize. These competitions have now become highly esteemed and attract the attendance of officials from central government and industry, ZIE members, and staff and students from tertiary institutions</p> <p>→ <b>Tanzania – Institution of Engineers Tanzania (IET): Student exhibitions</b></p> <p>IET has run <b>student exhibitions</b> across all universities and colleges in Tanzania, where the best five entries are selected to be pitched to a wide range of stakeholders. According to IET, participants show great ingenuity and innovative thinking at these events. The exhibitions also offer students the chance to <b>patent or prototype their ideas</b>.</p>

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<p><b>Mentorship</b></p> 	<ul style="list-style-type: none"> <li>→ Finding enough qualified mentors with relevant technical skills (particularly from underrepresented groups, such as women)</li> </ul>	<ul style="list-style-type: none"> <li>→ Understanding students' needs and expectations in relation to mentors</li> <li>→ Ensuring that there are mentors from different professional backgrounds and underrepresented groups</li> </ul>	<ul style="list-style-type: none"> <li>→ <b>Nigeria – Nigerian Institution of Mechanical Engineers (NIMechE):</b> <a href="#">Virtual mentorship platform</a> NIMechE's online platform allows students and recent graduates to <b>connect with potential mentors</b> who are professionals in the engineering industry. The platform also has a substantial catalogue of <b>internship and job opportunities</b>. The platform was launched in July 2020, and NIMechE intends to continue expanding its capabilities, including adding functions for virtual meetings and chat rooms.</li> <li>→ <b>Sierra Leone – Sierra Leone Institution of Engineers (SLIE):</b> <a href="#">Student mentorship programme</a> SLIE's Women's Chapter, Sierra Leone Women Engineers, offers <b>mentoring to female secondary students</b> to raise awareness of the opportunities available to them within the industry, and to help to <b>close the significant gender gap</b> in engineering. The mentors (who are young female graduates) also provide weekly tutoring sessions for their mentees in mathematics and physics.</li> </ul>
<p><b>Online education</b></p> 	<ul style="list-style-type: none"> <li>→ Ensuring access to a laptop and internet connection</li> <li>→ Moving courses from an in-person format to online</li> </ul>	<ul style="list-style-type: none"> <li>→ Providing participants with data allowances and laptops</li> <li>→ Supporting lecturers in creating online resources</li> <li>→ Understanding students' learning needs</li> <li>→ Ensuring that courses go beyond standard curricula to provide industry-relevant knowledge</li> <li>→ Collaborating with a variety of industry stakeholders in the design of the courses</li> </ul>	<ul style="list-style-type: none"> <li>→ <b>Nigeria – Nigerian Institution of Mechanical Engineers (NIMechE): ENGentrepreneur Digital School</b> To adapt to the COVID-19 restrictions, NIMechE began offering <b>online courses for undergraduate and graduate students</b>. Students can <b>gain certification</b> upon passing an examination at the end of the course. NIMechE directly targets students from 33 universities across Nigeria. It has collaborated with the national student forum to ensure that priority courses are offered. The digital school has also received inputs from both academia and industry to ensure that the curricula account for shortcomings in students' current education. Students pay fees for the courses, which ensures sustainability, so the school has strong potential for expansion and replication.</li> </ul>