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Building laboratories where there were none

Advancing Knowledge NPC is transforming under-resourced schools into STEM hubs, 67 science laboratories and counting

Tracy Lee Stark

There is a moment that Prof Shaheed Hartley, Director and CEO of *Advancing Knowledge* Non-Profit Company (AK NPC), knows well. It is the moment a learner from a township or rural school walks into a purpose-built, fully equipped science laboratory for the first time and discovers that the experiments in their textbook can actually be performed. That the equipment is real. That science is not something that happens only in other people's schools.

"Sustainable improvement in science outcomes requires both confident, knowledgeable teachers and conducive learning environments," Hartley says. "You cannot have one without the other."

Advancing Knowledge NPC was established in 2019 to address inequalities its founders found impossible to accept. Research by Hartley had identified persistent gaps in science and mathematics education in disadvantaged township and rural schools: weak educator content knowledge, limited practical skills and inadequate laboratory infrastructure. Most historically disadvantaged schools had simply not been built with facilities for practical experimentation, closing doors for an entire generation before they had a chance to walk through them.

The response AK NPC designed is integrated and deliberately sequenced. Teacher training comes first, always, before construction begins. The three standardised Science Teaching and Learning Centre (TLC) models, designed by Hartley and copyright-registered in 2022, convert ordinary classrooms into fully equipped, CAPS-aligned science environments, a replicable prototype for STEM infrastructure reform.

Since 2019, AK NPC and its principal partners, the Garden Cities Archway Foundation and the Western Cape Education Department, have constructed 67 Science TLCs, 60 in the Western Cape and seven in the Eastern Cape, with funding for a further 12 secured for 2026. Each costs approximately R1.75 million.

The list of schools reached reads like a map of Western Cape education: Siyabulela Primary in Langa, Livingstone High in Lansdowne, Silikamva High in Hout Bay, and Gubevu Primary in the Eastern Cape.

The teacher development work is equally substantial: more than 1,000 educators have received training through over 35 SACE-accredited professional development courses since 2021, shifting science teaching towards inquiry-based experimental learning. AK NPC also runs STEM clubs, science competitions, a Women in Mathematics programme for Grade 11 girls, and annual National Science Week roadshows to rural schools.

Nowhere was that commitment more visible than at Gubevu Primary School in Ngamakwe, Eastern Cape, in June 2023, where AK NPC and the Eastern Cape Department of Education marked the completion of a new Science TLC with a three-day training programme for teachers from surrounding schools, many navigating hills, gravel roads and flooded stretches to attend.

"It was not about a building, a programme, or an organisation," Hartley says of the moment. "It was about teachers who were so committed to improving learning opportunities for their learners that they overcame significant challenges to access professional development."

The Science TLCs serve purposes beyond the school day, functioning as community hubs, generating local employment during construction and an income stream for schools through facility hire.

Prof Hartley's PhD was awarded in 2002 by Curtin University in Perth, following earlier qualifications from UWC, UCT and UNISA. He previously served as Director of the *Science Learning Centre for Africa* at UWC (2009-2019) and Director of Research at CPUT (2004-2009), and now holds an adjunct professorship at Walter Sisulu University.

In 2009, he received the NSTF Communication Award for promoting science and technology careers across the Breede River-Overberg region. In 2017, he received the Chancellor's Outstanding Alumnus Award and Academic Special Award from UWC, and his papers won Best Paper awards in 2014, 2016, 2017 and 2018.

The vision ahead is ambitious but grounded: expanding the Science TLC footprint into the Eastern Cape, the Northern Cape and other provinces, targeting a minimum of 25 centres a year, building a critical mass of STEM-capable South African learners who first discovered that science was for them in a laboratory that proved it.