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A review of the South African Institute of Physics (SAIP) roles in Physics for development, Education, and Outreach: Hindsight, foresight, and opportunities for South Africa through the hub-and-spoke model

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The SAIP plays a pivotal role creating a platform for physicists to network, collaborate, support one another, communicate their subject, influence science and technology policies, promote the study and applications of physics, monitor the quality standards of physics training, and foster the development of physics in South Africa. This presentation highlights how the SAIP has delivered on these critical roles, reviews opportunities for improvement, and how the physics community can be involved. SAIP education, outreach and women in physics activities are implemented through the hub-and-spoke model, providing an opportunity for broad-based participation and involvement.

SAIP has over the years engaged with physics development, initiatives include hosting the Word Conference on Physics and Sustainable Development in 2005, the review on shaping the future of physics in South Africa, the formation of NITheP, SA-CERN research, SANReN, entrepreneurship for physics, and physics in industry day, among others. However, reviewing publications on WOS authored by South Africans about Physics and sustainable development, one finds less than 5 articles showing a dire need for the physics community to be involved in matters related to physics and sustainable development. Under outreach and public understanding of physics, SAIP has developed resources ranging from careers booklets to videos such as the Physics in our Everyday Life series, participates in the National Science Week, Science Festivals, and radio campaigns. Programmes such as "Physics in my Village Competition" and the South African Physics Olympiad (SAPhO) have facilitated naturing young talent into physics. Through the Women in Physics in South Africa (WiPiSA) programme, projects such as the Women in Physics lunches, and Women in Physics August month celebrations are now a permanent feature. Over the last three years, the average impact from these outreach programmes was over 2 million people per annum. In 2008, Physics HoDs raised concerns about the weak background of new first-year students, the SAIP commissioned a review and produced a benchmark statement on physics training that was adopted in 2019. During the period, 2020-2023, 18 teacher workshops were held where 1017 teachers participated, and 146 facilitators were trained. Given the shortage of physics laboratory facilities in schools, training on virtual physics experiments was introduced in 2022. Preliminary evaluations showed that teachers' confidence in facilitating the Physical Science Virtual experiments improved by 32.96 %, i.e., from 51.80 % to 84.76 %. The Essential Skills for Matric resources were introduced in 2020 and over 30 000 booklets and 2000 USBS were distributed reaching over 330 schools and 11537 learners in 7 provinces. An additional 2952 individuals accessed the materials online.

A monitoring and evaluation report based on qualitative and quantitative programme evaluation results from the teacher development and outreach programmes will be discussed. Preliminary analysis indicate that the education programme is making a positive impact. Quantitative feedback indicated that teachers' competence improved by between 10% and 40%, however, rigorous impact analysis is required, and this presents a research opportunity. From a strategic point, the SAIP is probing the effectiveness of these interventions, how they can be improved, how can more physicists be involved, can we track the beneficiaries, etc.? These are research questions for physicists to help SAIP answer.

Key Words: Physics education, physics outreach, physics for development, women in physics, hub-spoke model, monitoring and evaluation, impact assessment

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No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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Yes, I ACCEPT

Primary author: MASARA, Brian (SAIP)

Co-authors: NAIDOO, Deena (School of Physics, University of the Witwatersrand); CHITHAMBO, Makaiko (Rhodes University); Prof. ERASMUS, Rudolph (University of the Witwatersrand)

Presenters: MASARA, Brian (SAIP); CHITHAMBO, Makaiko (Rhodes University)

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