



Contribution ID: 48

Type: Oral Presentation

Teaching measurement and uncertainty the SI way

Tuesday, 27 July 2021 12:15 (15 minutes)

In May 2019 a very significant event in the world of metrology occurred whereby all seven of the SI base units were refined in reference to seven “defining” constants. Among them are fundamental constants of nature such as the Planck constant and the speed of light, and thus the definitions are based on and represent our present understanding of the laws of physics. The new self-consistent approach offers a unique opportunity to make useful impact on physics education both at high school and university level.

The present project is developing a set of teaching materials for use by educators and students which introduce the fundamentals of measurement and uncertainty in ways which are aligned to the ISO-recommended framework for measurement 1.

The work is being informed both by our research into students’ understanding of measurement [2], and our experience in teaching measurement and uncertainty to university students [3]. It has been shown [4] that students are able to develop a more robust understanding of the nature of scientific measurement when the measurement result is understood to be a statement of knowledge. Uncertainty is then associated with the quality of this knowledge.

We present the development of posters which are freely available for download [3], and progress towards a set of worksheet-based materials which are aimed to be distributed to schools and universities throughout South Africa and beyond. The teaching materials will be designed to be used within a wide range of contexts, with few additional resources, and will also introduce the new definitions of the SI base units in a way which promotes an improved philosophy of scientific measurement.

1 BIPM, IEC, IFCC, ISO, IUPAC, IUPAP and OIML (1995) *Guide to the Expression of Uncertainty in Measurement* (GUM) (Geneva: ISO)

[2] A. Buffler et al. (2001) *Int. J. Sci. Educ.* **23**, 1137.

[3] [<http://www.measure.uct.ac.za/msr/education>]

[4] A. Pillay et al. (2008) *Eur. J. of Phys.* **29**, 647.

Apply to be considered for a student ; award (Yes / No)?

No

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

N/A

Primary authors: Dr KARSTEN, Aletta (National Metrology Institute of South Africa); Prof. BUFFLER, Andy (University of Cape Town); Ms MAJIET, Nuraan (University of Cape Town); Dr HUTTON, Tanya (University of Cape Town); Dr LEADBEATER, Tom (University of Cape Town); Dr LOUW, Wynand (National Metrology Institute of South Africa)

Presenter: Prof. BUFFLER, Andy (University of Cape Town)

Session Classification: Physics for Development, Education and Outreach

Track Classification: Track E - Physics for Development, Education and Outreach