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IAEA e-learning tools

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Research reactors (RRs) have contributed for more than six decades and continue contributing to the advances in nuclear science and technology development in IAEA Member States (MS), including nuclear power. The sustainability of their life-cycle is an issue of major concern and MS are increasingly seeking Agency's assistance in addressing the main challenges related to RR sustainable operation, including effective utilization, as well as in building new and accessing existing RRs for developing their national nuclear programmes and strategies, including for development of human capital.

There are currently 216 operational research reactors (RR) in the world, with another 41 planned, under construction or in temporary shutdown [1]. The most widely used technique is Neutron Activation Analysis, with 118 RRs in 53 Member States. With many neutron activation analysis scientists and engineers retiring, and with many newcomers having a non-nuclear background, it behoves the national and international communities to pass on the information in a non-traditional format, namely e-learning.

Since the middle 1990s, e-learning has slowly infiltrated and now integrates education at all levels. E-learning encompasses a wide array of deliveries from simple introductions of animations in a teaching class to Massive Open Online Courses (MOOCs) and Modular Object-Oriented Dynamic Learning Environment MOODLEs. E-learning takes an extra challenge where the subject matter is highly scientific and engineering oriented encompassing multiple complex mathematical notations and concepts. A straight forward presentation of equations in PowerPoint is a recipe for an unsuccessful delivery of lectures. The challenge exists of how to deliver these concepts without the use of a traditional blackboard.

An e-learning tool for NAA has been developed by the IAEA for the Member States, to pass on the basics and more advanced forms of the technology in a manner such that both novices starting their careers in this area and higher level staff members and academics can utilize the modules developed to refresh themselves or to teach others. The modules are organised in seven categories covering all the essential aspects of NAA: Introduction, Basic Nuclear Physics, Instrumentation, Calibration, Quality, NAA Practice and Varieties of NAA.

The e-learning tool for NAA will be presented, leading to a discussion on future expansion to other areas of utilization of RRs. There is currently a substantial need to develop strategies for RR effective utilization on a national, regional and international basis, given that a significant number of these facilities are ageing and not utilized to their full potential. Neutron imaging is the second most common technique reported in the IAEA RRDB, with 72 facilities in 39 Member States. With many users coming from areas as diverse as materials research, cultural heritage or environmental studies, the need and scope for developing an e-learning course for neutron imaging will be discussed.

[1] IAEA Research Reactor Data Base https://nucleus.iaea.org/RRDB/RR/ReactorSearch.aspx

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