An E-learning Tool as Living Book for Knowledge Preservation in Neutron Activation Analysis.

Peter Bode [a,], Sheldon Landsberger [b], Danas Ridikas [c] and Alesia Iunikova [d]*

[a] NUQAM Consultancy, 3284LK-37 Zuid-Beijerland, The Netherlands;[b]University of Texas, Austin, TX 78758, USA;
[c] International Atomic Energy Agency (IAEA), Vienna, Austria; [d]ROSATOM CICE&T, Obninsk, Russian Federation.
** Corresponding author: peter.bode@ymail.com*

Neutron activation analysis (NAA) is one of the most common activities in nuclear research reactors, irrespective of their power size. Although being a well-established technique, it has been observed that retirement and/or departure of experienced staff often results in gaps in knowledge of methodological principles and metrological aspects of the NAA technique employed, both within the remaining NAA team and for new recruits.

Existing books and guidance documents on the concepts and execution of NAA [e.g., 1-6] are apparently not sufficient to ensure the timely transfer of knowledge on the practice of NAA. Specifically, these books often lack a dedicated part on (sources of) errors and troubleshooting once results are not trusted or unacceptable. This type of expertise is typically obtained by hands-on experiments or knowledge transfer by experienced scientists over relatively long period of time. However, there is often insufficient or no such overlap time between leaving expertise and newcomers.

These are a few of the considerations for the development of modern E-learning tool on practical aspects of NAA, the associated sources of errors and approaches for monitoring, identifying and compensation for them by trouble shooting. The project was facilitated by the IAEA.

Objectives of the e-learning tool

The overall objective of the E-learning tool in NAA is to realize a 'living book', summarizing the basic concepts of NAA and providing practical information on the implementation of the methodologies. . The tool informs the user also on (potential) errors made during e.g. the input of data, spectrum analysis/interpretation and reporting, and to some extent take over the educational role of the NAA supervisor. The tool will contribute to foster experience in NAA on the use of the technique, on sources of error and ways to overcome them in a pragmatic way. Eventually, this E-learning will contribute even to reduce the threshold for laymen for using NAA, and thus may provide an outlook for increased utilization of facilities and research reactors.

Description of the tool

The E-learning tool for NAA has a modular structure to which, if relevant, continuously new or better information can be added as new modules or as animations or movie clips. The tool consists of a series of about 2000 PowerPoint slides in more than 40 modules and has been reviewed and tested during an IAEA workshop by experienced and new coming practitioners. The tool is complementary to existing textbooks since it comprises information on the practice of NAA that either never has been published or which may be not universally available (anymore). The tool can be expanded with examples of practical cases that occurred in various NAA facilities and which usually are not suitable for documenting in scientific publications. These can easily be compiled and preserved so that the tool comprises not just the success stories of the practice but also the (daily) pitfalls.

The E-learning tool will be implemented in the year 2017 in the CLP4NET as part of the IAEA standard E-learning website. For each module both terminal training objectives and enabling training objectives have been identified. In addition, for each module a short introducing text was written. Different self-evaluations have been integrated in the modules based on the multiple choice, short/one line reply, true/false or corresponding response principle. Lecture notes have been added to the slides which, eventually, may be replaced by narrated voice-over.

The tool will act as a 'living book', to be biannually reviewed and if necessary extended and is expected to serve also as an archive, fostering unpublished experimental experiences.

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