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SEVENTH FRAMEWORK PROGRAMME

CINCH

CINCH-II

(Project Number: 605173)

DELIVERABLE D4.5

Workshop on Nuclear Chemistry Education and Training in Europe

Lead Beneficiary: **UH**

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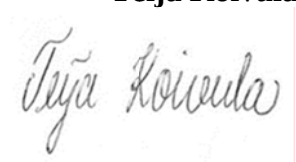		

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RE	Restricted to a group specified by the partners of the CINCH project	
CO	Confidential, only for partners of the CINCH project	

Version control table

Version number	Date of issue	Author(s)	Brief description of changes made
1.0	June 24th, 2015	T. Koivula	1st draft
1.1	June 24th, 2015	J. P. Omtvedt	Added WS day-2 report to draft
1.2	June 24th, 2015	M. Nemec	minor corrections to Moodle part

Relevance

This deliverable contributes to the following Work-Packages and Tasks:

☐ ALL

WP 1
☒ Task 1.1 ☐ Task 1.2 ☐ Task 1.3 ☐ Task 1.4

WP 2
☐ Task 2.1 ☐ Task 2.2 ☐ Task 2.3 ☐ Task 2.4

WP 3
☐ Task 3.1 ☐ Task 3.2 ☐ Task 3.3 ☐ Task 3.4 ☐ Task 3.5

WP 4
☐ Task 4.1 ☐ Task 4.2 ☐ Task 4.3 ☒ Task 4.4

WP 5
☐ Task 5.1 ☐ Task 5.2 ☐ Task 5.3 ☐ Task 5.4

Project information

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EXECUTIVE SUMMARY

A workshop on Nuclear and Radiochemistry education and training in Europe was organized in Helsinki, Finland, on June 15-16th, 2015, by UH. The first day of the workshop was entitled as “European collaboration in NRC education” including both general lectures and workshop discussions on following topics: NRC Network-European collaboration, NRC EuroMaster and Student exchange. Dr. Mojmir Nemec (CTU) and Dr. Jelena Mrdakovic Popic (NMBU) were the conveners of the group works, in addition to general convener of the session, Prof. Jukka Lehto (UH). Second day was dedicated to “E-learning tools in NRC education” with introductory lectures and hands-on-training. This session was organized by Prof. Jon-Petter Omtvedt (UiO), together with the representatives from CTU and IRS. The workshop had in total 38 participants from 13 different countries and 18 universities in Europe.

CONTENT

1 INTRODUCTION

The CINCH-II (Cooperation in education and training in nuclear chemistry - http://cinch-project.eu/) project organized a workshop on NRC education and training in Europe. Objectives of the workshop were to introduce CINCH activities and developments, as well as to promote European collaboration in Nuclear and Radiochemistry (NRC) E&T and to recruit additional institutions in the process. Specific tasks were to introduce and promote the NRC EuroMaster, the NRC Network and the e-learning tools developed in CINCH project.

The workshop was held in Helsinki (Finland), on June 15-16th, 2015, organized by the University of Helsinki.

First day of the workshop was entitled as "European collaboration in NRC education and training" including both general lectures and workshop discussions on three topics:

1. The NRC Network-European collaboration,
2. The NRC EuroMaster, and
3. Student exchange.

The second day was dedicated to "E-learning tools in NRC education and training" with introductory lectures and hands-on-training. In particular the following topics were presented:

1. The NucWik tool for sharing and joint development of teaching material,
2. The RoboLab remote-controlled laboratory exercises, and
3. The CINCH Moodle platform for e-learning courses.

The workshop had in total 38 participants from 13 different countries. Summary of the workshop days including outcome of the group works are discussed in this document. List of all participants/organizations as well as the workshop agenda are attached as Appendices.

2 DAY ONE: EUROPEAN COLLABORATION IN NRC EDUCATION AND TRAINING

2.1 Outcome of the group works

On Monday the participants were divided into three groups discussing on:

1. NRC Network (convener Jukka Lehto, UH)
2. NRC EuroMaster (convener Mojmir Nemec, CTU)
3. Student exchange (convener Jelena Popic, NMBU/NRPA)

The group work reports written by the conveners are described below. Members of the group are listed in a table included in each report.

2.1.1 Report of the group work 1 on NRC network

Basis for the group's discussions was the draft document "PROCEDURES AND PRACTICES OF THE EUROPEAN NETWORK ON NUCLEAR AND RADIOCHEMISTRY EDUCATION AND TRAINING" produced by J. Lehto (UH) and J. John (CTU). The document is attached (Appendix 4) as a version refined following the group work and discussion by Lehto and John after the workshop. Five topics were discussed in the group.

1. Is the NRC Network needed? All participants in the group saw that the Network in needed to improve collaboration in NRC E&T. It was, however, pointed out that the Network should be active to be valuable for the participants. Also, the Network should avoid unnecessary bureaucracy.
2. Functions of the Network. A new function (underlined) was added to those listed in the draft
   a. to cooperate in NRC education and training in Europe
   b. to promote development of NRC education and training in Europe
   c. <u>to represent NRC education and training community towards other organizations and society</u>
   d. to promote and organize student and teacher exchange between partners
   e. to organize common courses in NRC
3. Network management. Network management was modified and the responsibilities of the steering group were added. In addition it was seen necessary that the Network should have a vice chairman.
4. Selection of new members. Selection criteria for new members were simplified to the form "the candidate organization needs to be a relevant provider or end-user of NRC education and/or training".
5. Connections to ENEN (European Network on Nuclear Education). An idea to establish the NRC Network under ENEN umbrella was discussed. It was seen to have its pros and cons. It was decided that the NRC Network should be first established and the Network will only thereafter consider whether it will start negotiations with ENEN. If any negotiations will be carried out the decision should be based on terms and conditions agreed with ENEN.
6. Funding of the Network. It was only stated that new EU funding should be applied for the starting period of the Network.

GROUP 1	NRC NETWORK	
Lehto	Jukka	University of Helsinki, Finland (convener)
Türler	Andreas	University of Bern/PSI, Switzerland
Brown	Alex	National Nuclear Laboratory, UK
Ansoborlo	Eric	CEA, France
Blower	Philip	King's college London, UK
Konya	Jozsef	University of Debrecen, Hungary
Omtvedt	Jon Petter	University of Oslo, Norway
Vahlbruch	Jan-Willem	Leibniz University of Hannover, Germany
Hanson	Bruce	University of Leeds, UK
Groppi	Flavia	University of Milano, Italy
Warwick	Phil	University of Southampton, UK
Heath	Sarah	University of Manchester, UK
Espegren	Fredrik	Chalmers University of Technology, Sweden
Holt	James	Loughborough University, UK
Airaksinen	Anu	University of Helsinki, Finland

2.1.2 Report of the group work 2 on NRC EuroMaster

After short introduction to the fundamental criteria of the EuroMaster label, the discussion continued to purpose and target group of the EuroMaster and then the application form was discussed with the help of Application form of the CTU in Prague. In the following items, the main questions and comments are summarized:

- Personalization of the EuroMaster label. This question was already discussed during presentation of EuroMaster, if there is an option to grant EuroMaster to the students which meet requirements personally – independently on the curricula of the institution/university (with or without NRC programme)?
  - Answer and decision was that such options are not planned now – first the system of the label and its granting have to RUN well than it could be complicated by some exceptions or other options. EuroMaster is not meant as a label for students, but as a label of institution/programme related to the content of the education curricula.
- It is possible to grant EuroMaster in NRC, when an additional subject or credit units are needed?
  - Distant learning and sharing lectures is possible, but whole curricula should exist as well as and responsible subject, which can be awarded the EuroMaster label.
  - In case that the current curricula will be adapted to meet the minimum requirements, it is decision and related of the institutions and only its responsibility to get accreditation (or similar national approval) for the curricula. The EuCheMS Division of Nuclear and Radiochemistry (DNRC) needs only to see that the application form relates to real/existing approved curricula.
- What does the industry think about the EuroMaster?
  - They like it because it gives them information about the person and its NRC background.
  - It is necessary to inform as much industries as possible not only about the EuroMaster but also to get their opinion/comments

- How to fill the Application form, when it is not clear?
  - Just fill as much as possible in the simplest way and the questionable parts may be explained or commented in notes added to the tables or in an attachment.
- When and how the DNRC will start work on that, decision and granting?
  - The meeting of the Chairman and Secretary has to be organised to discuss final criteria and procedure.

Summary and conclusions:

The EuroMaster label and Application form was discussed in the group of 10 potential applicants. Detailed information was provided, the details of the application was explained using CTU application and the Deliverable 1.3: Sample application package as examples, and clarified in the discussion. Applicants were encouraged to fill the form and optionally explain the potential ambiguous or unclear parts; the evaluators will ask them for clarification if necessary.

Meeting of the DNRC is necessary to set up the final procedure and test it when evaluating the first applications.

GROUP 2	**NRC EUROMASTER**	
Němec	Mojmír	Czech Technical University in Prague, Czech Republic (convener)
Nagy	Noémi	University of Debrecen, Hungary
Helariutta	Kerttuli	University of Helsinki, Finland
Koivula	Teija	University of Helsinki, Finland
Pashalidis	Ioannis	University of Cyprus, Cyprus
Kajan	Ivan	Chalmers University of Technology, Sweden
Evans	Nick	Loughborough University, UK
Todorov	Boyan	University of Sofia, Bulgaria
Rajec	Pavol	Comenius University, Bratislava, Slovakia
Tóth-Bodrogi	Edit	University of Pannonia, Hungary

2.1.3 Report of the group work 3 on student exchange

Student exchange is already in place in different countries in somewhat different forms, such as:

- Attendance of courses (with transfer of ECTS)
- Research mobility
- Summer and research schools
- Master programmes

Student mobility plays proven significant role for today's education. It allows maximizing a profitable use of resources, facilities, infrastructure and expertise and exchange of knowledge, networking and possibly allows for some job opportunities. Strategy for student exchange within joint education and training programs is necessary. From previous experience, student exchange means much more work for organizers.

Issues of importance for this topic are:

- Funding
- Minimum requirements
- Quality assurance

- Announcement (to be attractive for students)
- Sustainability
- Teaching language
- Diploma issues

Funding

Various models for funding can be used – national and international funds and scholarships. National funding are somewhat specific in different countries, while at international level funding of student exchange is possible within diverse joint European projects, Erasmus Mundus programmes, specific collaboration within consortium etc. In some countries, it is also possible to pay a fee for student attendance to specific courses.

Funding is of great importance for sustainability of student exchange option within joint programmes like EuroMaster. The NRC network promotes student and teacher exchange between partner universities. To enable this the partner universities will make mutual Erasmus agreements and consider finding other funding sources for exchange.

Erasmus Mundus+ offers several possibilities for cooperation and allows mobility of both teachers and students through several key-actions. One possibility is to organize Erasmus Mundus Joint Master Programme (EMJMP) and ensure money for student exchange. The programme has calls each year in period 2014-2021. However, organization of joint master programme would require great load of administrative work.

Minimum requirements

Minimum requirements should be in place to allow student exchange within NRC education in Europe. Radiation safety is one of the key-points to be addressed. Common assessment criteria for courses adopted in joint program may ensure getting qualified students and quality control. Approved and harmonized minimum requirements would help getting ‘right’ students in ‘right’ places.

Quality assurance

Quality assurance of courses provided in joint study programmes is done at national levels. Obtaining the EuroMaster label would contribute to overall quality of integrated study programmes.

How to be attractive for more students within Europe?

Increase the number of European students enrolling into the programme is not an easy task. Many universities and research groups have experiences decreased level of students’ interest for studying nuclear and radiochemistry. Compatibility in educational systems, possibility for students funding, connection to various stakeholders that may ensure jobs may help in making a serious advertising study options. It is important to make attractive and targeted programmes – e.g. hands on radiochemistry courses, radiation safety courses.

Teaching language

There is a common practise in European universities to offer courses (at Master level) also in English language. Therefore, this item is not seen to be problematic within NRC network.

Diploma issues

Depending on the way of student study option (for instance taking some courses or participating in joint master study) several options can be actual for diploma issuing – from credit transfer certificate to joint degree. For joint study programs, there are possibilities:

- To provide joint diploma
- To provide national diplomas /double or multiple diplomas

A joint diploma represents one possible outcome of an integrated course of study. An integrated study programme envisages a curriculum that has been jointly designed by two universities and is regulated by a specific negotiated agreement. Students who freely choose the programme in both academic establishments in terms of duration and content. At the end of the courses and after the relevant joint examinations, the students are awarded a single qualification jointly signed by the academic authorities of both institutions (joint degree). A joint degree is always backed up by a collaboration agreement between two (or more) universities and an integrated curriculum which defines the study periods to be undertaken separately in the universities concerned.

In other option, each university has its 'own' student that it is responsible for although joint study programme is approved. In this case, at least two diplomas would be issued by two higher education institutions from different countries and fully recognized in these countries.

GROUP 3	**STUDENT EXCHANGE**	
Popic	Jelena	NMBU/NRPA, Norway (convener)
Koivula	Risto	University of Helsinki, Finland
Retegan	Teodora	Chalmers University of Technology, Sweden
Schoultz	Bent Wilhelm	University of Oslo, Norway
Wærsted	Frøydis Meen	Norwegian University of Life Sciences, Norway
Siitari-Kauppi	Marja	University of Helsinki, Finland
Bartl	Pavel	Czech Technical University in Prague, Czech Republic
Taylor	Sarah	Loughborough University, UK
Morariu	Claudia	Leibniz University of Hannover, Germany

3 DAY TWO: E-LEARNING TOOLS IN NRC EDUCATION AND TRAINING

The second day of the Helsinki workshop was organized as a mixture of lectures and hands-on work sessions with the following program:

- Introduction to CINCH E-learning tools (45 min lecture by Prof. J. P. Omtvedt, UiO)
- NucWik Hands-on Workshop (2½ hours)
- Lunch break
- RoboLab Hands-on workshop (1½ hours)
- Introduction to CINCH Moodle Courses (45 min)
- Discussion – Incorporating E-tools in Teaching (45 min)

Emphasis was given to allow the participants to try out the different tools directly, using their own laptops. The indicated time allocated to each part of this second day was therefore only used as a guide and the sessions adapted to practical needs. The second day started at 09:00 and ended 16:30.

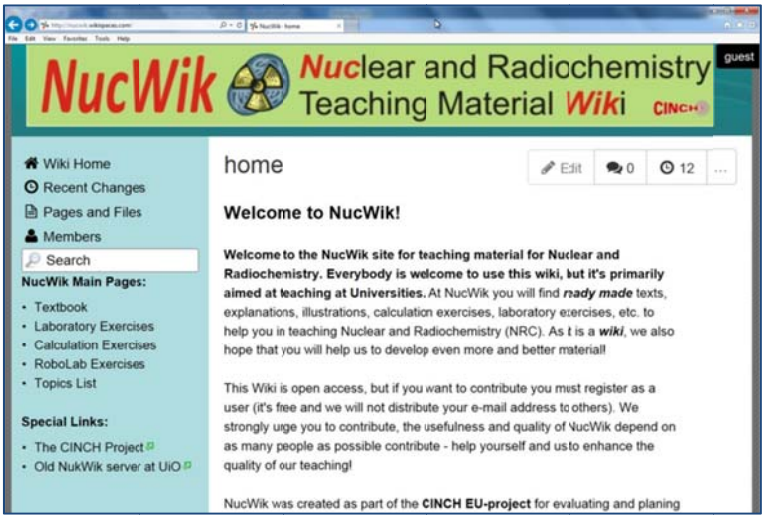
The introductory lecture, presented by Prof. Jon Petter Omtvedt from University of Oslo, gave a general introduction to e-learning tools, followed by examples of how the tools developed by the CINCH project can be used in third-party teaching. Copies of the slides are attached to this document and a podcast of the lecture was recorded. The podcast will be made available, when production is finished, from the CINCH web-site.

3.1 CINCH E-learning Tools

As deliverables of the CINCH project, a number of e-learning tools will be provided. The most important of these were demonstrated for the teachers participating in the workshop.

3.1.1 NucWik

The NucWik wiki[1] database (http://nucwik.wikispaces.com/) was established according to the plan for task 3.1 of Work Package 3 of the CINCH-II project. NucWik is an open platform for sharing teaching material and promotion of active collaboration across institute/university borders. Details about NucWik have already been reported in Deliverable 3.1 and will not be repeated here.



The welcome page of NucWik is shown to the left.

[1] Wiki, as defined by Wikipedia.org: "A **wiki** is a web application which allows people to add, modify, or delete content in collaboration with others. In a typical wiki, text is written using a simplified markup language or a rich-text editor. While a wiki is a type of content management system, it differs from a blog or most other such systems in that the content is created without any defined owner or leader, and wikis have little implicit structure, allowing structure to emerge according to the needs of the users." See http://en.wikipedia.org/wiki/Wiki for more.

Feedback from the hands-on session was that the NucWik tool was regarded as a useful tool for NRC teachers. Everybody managed to navigate and use NucWik content without problems. Uploading content was shown and tried out. Users experienced with web-page and on-line text editors were able to upload material easily, the less experienced would probably either need help or more training.

It was made very clear for the participants that NucWik will only be as good as the users make it: Active participation and sharing of material is necessary to make NucWik a success. Furthermore, the importance of using the feedback mechanisms (commenting on pages) is vital to create a useful and updated wiki.

Copies of the slides used to introduce NucWik are provided in Appendix 6.

3.1.2 Robolab

As explained on the NucWik Robolab wiki-page[2], RoboLab is remote-controlled exercises in a real radiochemistry laboratory. It allows you to perform radiochemistry experiments with real equipment in an actual laboratory without all the hassle of being trained, authorized and suited up. Its main purpose is to be used as a complementary teaching tool when teaching radiochemistry to undergraduate and graduate students at university level.

During this part of the workshop two RoboLab exercises were demonstrated live, one from the UiO laboratory and one from the IRS laboratory:

- RL2: Neutron-activation of Ag (UiO)
- RL3: HPGe γ-spectroscopy of environmental samples (IRS, online)

Both demonstrations were successful and well received. Participants from several universities declared that they already have planned to use RoboLab exercises in their upcoming teaching.

The CINCH project will develop and deliver four additional RoboLab exercises:

- RL1: Absorption of radiation in matter (UiO, expected on-line in August 2015)
- RL4: Autodeposition on an iron plate (IRS, planned)
- RL5: Ion exchange column with "on-line" detection (IRS, planned)
- RL6: Milking ^{234m}Pa from ^{234}Th adsorbed on DOWEX column (UiO, expected online in January 2016)

Copies of the slides used to introduce RoboLab are provided in Appendix 7.

3.2 CINCH Moodle platform

CINCH project staff from CTU, Pavel Bartl and dr. Mojmir Nemec, presented the CINCH Moodle platform. Guest accounts were provided which the workshop participants could use to logon to the system in order to get a feeling for the system capabilities.

It was demonstrated how courses could be accessed and how material for future courses could be used and added. During the presentation, building of new course from the available material already

[2] http://nucwik.wikispaces.com/RoboLab+Exercises

present on CINCH Moodle was shown and explained. In the related discussion afterwards, the differences between NucWik and Moodle platforms, their complementarity, and utilization in education were discussed.

The platform was well received and there was consensus that courses provided on the platform would be useful for many teaching needs. However, to develop new courses or material much more than half an hour of instruction is needed. Nevertheless the introduction served well to make potential users aware of the capabilities and possible uses.

4 CONCLUSIONS

The workshop on Nuclear and Radiochemistry education and training in Europe was organized as part of CINCH-II project, namely under WP4 “Vision, Sustainability and Awareness”. The event had participants from 18 different universities and 5 representatives from industry/organizations related to nuclear and radiochemistry. Therefore, significant part of the European NRC community giving education and/or training in the field was reached. The workshop program enabled the CINCH-II consortium to promote the plan for NRC Network as well as to advertise and recruit members to EuroMaster collaboration. Moreover, E-learning tools developed under the project were demonstrated to potential users.

To summarize, the workshop was a great success and promoted very well introduction of CINCH developments and European collaboration in NRC E&T in general.

5 APPENDIX 1: WORKSHOP PROGRAM

WORKSHOP ON NUCLEAR AND RADIOCHEMISTRY EDUCATION AND TRAINING IN EUROPE

Organised by the CINCH EU project

Monday 15.6.: European collaboration in NRC education and training

Morning session 9:00-12:40

9.00 Opening of the workshop Jukka Lehto – University of Helsinki, Finland

9.05 CINCH-project Mojmír Němec– CTU, Czech Republic

9.20 NRC Education in European universities Teija Koivula – University of Helsinki, Finland

9.50 EuroMaster and NRC Network Jukka Lehto – University of Helsinki, Finland

10.30 Coffee break

11. 00 Evaluation of EuroMaster's applications Nick Evans – Loughborough University, UK

11.20 Student exchange NMBU representative, Norway

11.40 Stakeholder needs for education Jelena Mrdakovic Popic – NRPA, Norway

12.00 European Nuclear Education Network (ENEN) Filip Tuomisto, Aalto University, Finland

12.20 IGD-TP's Joint activity on Competence Maintenance, Education and Training

Marjatta Palmu, IGD-TP/Posiva Oy, Finland

Lunch 12.40-14.00

Afternoon session 14:00-17:30

14.00 Group work on

1) Student exchange (convener J. Mrdakovic Popic)

2) NRC EuroMaster (convener M. Němec)

3) NRC Network – European collaboration (convener J. Lehto)

15:30 Coffee break

16.00 Outcome of the group work

18.30 Dinner

Tuesday 16.6.: E-learning tools in NRC education and training

Morning session 9:00-12:40

- Introduction to CINCH E-learning Tools (45 min) Jon Petter Omtvedt, UiO, Norway
- NucWik Hands-on workshop J.P. Omtvedt, UiO, Norway
  - Session A: Introduction

10:15-10:40 Coffee break

  - Session B: Using material from NucWik in your own teaching
  - Session C: Contributing material to NucWik

Lunch 12:40-14:00

Afternoon session 14:00-17:30

- Robolab: Hands-on workshop (2 hours) J.P. Omtvedt, UiO, Norway
  - Session A: Introduction (30 min)
  - Session B: n-activation of Ag J.P. Omtvedt, UiO, Norway
  - Session C: γ-spectroscopy J.-W.Vahlbruch, C.Morariu, U. Hannover
  - Discussion and ideas

15:30-16:00 Coffee break

- Introduction to CINCH Moodle courses (45 min) Mojmír Němec, Pavel Bartl, CTU, Czech Republic
- Discussion – incorporating e-tools into our teaching (45 min)

6 APPENDIX 2: LIST OF PARTICIPANTS

Last name	First name	Organisation
Airaksinen	Anu	University of Helsinki, Finland
Ansoborlo	Eric	CEA, France
Bartl	Pavel	Czech Technical University in Prague, Czech Republic
Blower	Philip	King's college London, UK
Brown	Alex	National Nuclear Laboratory, UK
Espegren	Fredrik	Chalmers University of Technology, Sweden
Evans	Nick	Loughborough University, UK
Groppi	Flavia	University of Milano, Italy
Hanson	Bruce	University of Leeds, UK
Harjula	Risto	University of Helsinki, Finland
Heath	Sarah	University of Manchester, UK
Helariutta	Kerttuli	University of Helsinki, Finland
Holt	James	Loughborough University, UK
Kajan	Ivan	Chalmers University of Technology, Sweden
Koivula	Teija	University of Helsinki, Finland
Koivula	Risto	University of Helsinki, Finland
Konya	Jozsef	University of Debrecen, Hungary
Lehto	Jukka	University of Helsinki, Finland
Morariu	Claudia	Leibniz University of Hannover, Germany
Nagy	Noémi	University of Debrecen, Hungary
Němec	Mojmír	Czech Technical University in Prague, Czech Republic
Omtvedt	Jon Petter	University of Oslo, Norway
Palmu	Marjatta	POSIVA Oy and IGD-TP, Finland
Pashalidis	Ioannis	University of Cyprus, Cyprus
Popic	Jelena	NMBU/NRPA, Norway
Rajec	Pavol	Comenius University, Bratislava, Slovakia
Retegan	Teodora	Chalmers University of Technology, Sweden
Schoultz	Bent Wilhelm	University of Oslo, Norway
Scully	Paul	National Nuclear Laboratory, UK
Siitari-Kauppi	Marja	University of Helsinki, Finland
Taylor	Sarah	Loughborough University, UK
Todorov	Boyan	University of Sofia, Bulgaria
Tóth-Bodrogi	Edit	University of Pannonia, Hungary
Türler	Andreas	University of Bern/PSI, Switzerland
Tuomisto	Filip	Aalto University and ENEN, Finland
Wærsted	Frøydis Meen	Norwegian University of Life Sciences, Norway
Vahlbruch	Jan-Willem	Leibniz University of Hannover, Germany
Warwick	Phil	University of Southampton, UK

7 APPENDIX 3: LIST OF ORGANISATIONS

University of Helsinki, Finland
Czech Technical University in Prague, Czech Republic
King's college London, UK
Chalmers University of Technology, Sweden
Loughborough University, UK
University of Leeds, UK
University of Manchester, UK
University of Debrecen, Hungary
University of Pannonia, Hungary
Leibniz University of Hannover, Germany
University of Oslo, Norway
University of Cyprus, Cyprus
Comenius University, Bratislava, Slovakia
University of Sofia, Bulgaria
University of Bern/PSI, Switzerland
Norwegian University of Life Sciences, Norway
University of Southampton, UK
University of Milano, Italy

Commissariat à l'énergie atomique et aux énergies alternatives
National Nuclear Laboratory, UK
Norwegian Radiation Protection Authority
European Nuclear Education Network
Implementing Geological Disposal of Radioactive Waste Technology Platform

8 APPENDIX 4: PROCEDURES AND PRACTICES OF THE EUROPEAN NETWORK ON NUCLEAR AND RADIOCHEMISTRY EDUCATION AND TRAINING

The following universities and research institutions:

University of Helsinki, Helsinki, Finland

University of Oslo, Oslo, Norway

Loughborough University, Loughborough, UK

Chalmers University of Technology, Gothenburg, Sweden

Norwegian University of Life Sciences, Ås, Norway

Czech Technical University in Prague, Prague, Czech Republic

Gottfried Wilhelm Leibnitz University, Hannover, Germany

University of Leeds, Leeds, UK

National Nuclear Laboratory, UK

Comissariat á L'énergie Atomique et aux Énergies Alternatives, France

have agreed, by signing a Letter of Intent, on establishment and operation of the **European Network on Nuclear and Radiochemistry Education and Training (European NRC Network)**:

1. Objectives and functions

The objectives and functions of the European NRC Network are:

- to cooperate in NRC education and training in Europe
- to promote development of NRC education and training in Europe
- to represent NRC education and training community towards other organizations and society
- to promote and organize student and teacher exchange between partners
- to organize common courses in NRC

2. Management of the Network

Decisions within the network are done in the general assembly and in the steering group.

The general assemblies are held once every two years, usually during NRC9 and RadChem conferences. The first general assembly will be held during NRC9 in Helsinki in 2016. The general assembly elects the steering group and its chairman for a two years period starting 1st of January following the election. The general assembly also decides on work plans for every two years period and any other matters needed. The first steering group for the starting period 2015-2016 is elected

by the CINCH EU project.

Steering group consists of five to seven members from different partner organizations representing well all types of partners. The chairman of the steering group is the representative of the coordinator university. Steering group elects a vice chairman from the members of the steering group. Steering group meets at least once a year. Steering group decides on the following matters:

- annual work plan and report
- annual budget and fiscal report
- selection of new Network members
- relations to other organizations

The home university of the steering group chairman takes care of network coordination. The responsibilities of the chairman and the coordination university are:

- organize the steering group and general assembly meetings and prepare minutes of the meetings
- prepare draft of annual plan and annual report of the network for the steering group
- maintain the home pages of the network
- take care of official contacts to the EuCheMS NRC Division and other organizations such as ENEN in the way decided by steering group and general assembly

3. Selection of members

Additional members to the Network are accepted by application and by approval of the steering group. To become a member of the Network the candidate organization needs to be a relevant provider or end-user of NRC education and/or training.

4. Organization of resident courses

The network organizes one to two weeks summer/winter etc. school (resident course).

5. Promotion and organization of student and teacher exchange

The network promotes student and teacher exchange between partner universities. To enable this the partner universities will make mutual Erasmus+ agreements and consider finding other funding sources for exchange. To help student exchange, partner universities also consider increasing the role of English as their teaching language.

6. Organization of education sessions at EuChemS conferences

The network coorganizes, with organizing institution, the education sessions in EuCheMS nuclear and radiochemistry conferences, NRC and RadChem.

7. NRC EuroMaster Group

A NRC EuroMaster Group is formed within the network by the universities that fulfill the requirements set in the "Minimum Requirements for the EuroMaster Degree in Nuclear and Radiochemistry", prepared by the EU project Cooperation in Education and Training in Europe (CINCH), and that were granted the right to award NRC EuroMaster label to their students. This right is granted by the Nuclear and Radiochemistry Division of the European Association for Chemical and Molecular Sciences (EuCheMS NRC Division). An application package for the NRC EuroMaster has been prepared in the CINCH II project in 2015 and is available from the http://www.cinch-project.eu web site.

A university that does not fulfill the requirements in its own teaching program can apply for the right to grant "EuroMaster in Nuclear and Radiochemistry" label "in collaboration" with a specific network member university(ies) or with the NRC network as a whole to complete the lacking offer of courses. In this case the curricula of such a university should state that the required, but not offered studies are carried in another partner university.

8. Joint degrees

The NRC EuroMaster Group will seriously consider establishing joint degrees either among all group members or among a limited number of partners. Joint degree aims to recognition of the degree in all universities participating in such a system.

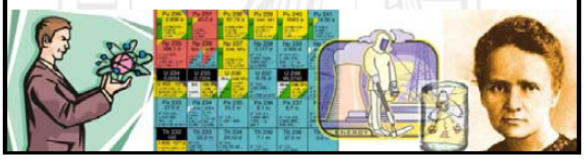
9 APPENDIX 5: SLIDES FROM E-LEARNING TOOLS INTRODUCTION LECTURE

This lecture was presented by Prof. Jon Petter Omtvedt, University of Oslo. A PodCast of this lecture will, when production is finished, be provided from the CINCH website.

CINCH

E-learning Tools in NRC Teaching

Jon Petter Omtvedt
Univ. Oslo and the CINCH collaboration
Workshop on NRC teaching,
Helsinki 15th - 16th June 2015



Schedule – Morning Session

- **Introduction to CINCH E-learning Tools** (45 min)
  Jon Petter Omtvedt, UiO
- **NucWik Hands-on workshop** (2½ hours)
  J.P. Omtvedt (and H. V. Lerum), UiO
  - Session A: Introduction
  - Session B: Using material from NucWik in your own teaching
  - Session C: Contributing material to NucWik
- Lunch 12:30-14:00 (free)

Schedule – Afternoon Session

- **Robolab: Hands-on workshop** (1½ hours)
  Jon Petter Omtvedt, UiO and Claudia Morieu, Jan-Willem Vahlbruch, IRS
  - Session A: Introduction
  - Session B: n-activation of Ag (UiO)
  - Session C: γ spec. of environmental samples (IRS)
  - Discussion and ideas
- Break
- **Introduction to CINCH Moodle Courses** (45 min)
  Mojmir Nemec (CTU)
- **Discussion – Incorporating E-tools in Teaching** (45 min)

CINCH

Introduction to CINCH E-learning Tools

Jon Petter Omtvedt
Univ. Oslo and the CINCH collaboration
NRC Workshop, Helsinki 15th – 16th June 2015

Teaching the Next Generation..

Before (→ 1999):

- Lectures
- Calculation exercises (using pen, paper and a calculator)
- Laboratory exercises
- Self study (read the text book)
- Project work (maybe)

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Today (2000 →):

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Teaching the Next Generation..

Before (→ 1999):
- Lectures
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- Laboratory exercises
- Self study (read the text book)
- Project work (maybe)

Today (2000 →):
- Computers (and digital technology) are everywhere

Teaching the Next Generation..

Before (→ 1999):
- Lectures
- Calculation exercises (using pen, paper and a calculator)
- Laboratory exercises
- Self study (read the text book)
- Project work (maybe)

Today (2000 →):
- Students (and most other people) work differently ..
- Information is always on-line and available..
- Social life, not only work, is "ditigized" ..
- Everything is "in the cloud" ..

Teaching the Next Generation..

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- Lectures
- Calculation exercises (using pen, paper and a calculator)
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Today (2000 →):
- Students (and most other people) work differently ..
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- Everything is "in the cloud" ..

Students expect (and deserve) more!

Modern Teaching

.. needs digital content and methods:
- Use internet to find information
- Use on-line applications to do things "the modern way"
- Use computer applications to aid teaching and learning
- Use the digital "social networks" to communicate

skype

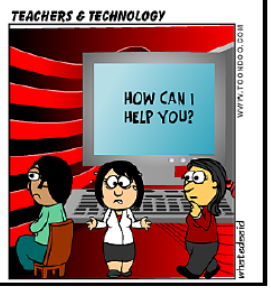
WIKIPEDIA
The Free Encyclopedia

Google

Find us on Facebook

E-teaching – do you do it?

- Webcasting, podcasting, whatever-casting..
- Facebook, Twitter, SMS, .., "Social media"
- E-learning platforms
- Blogs and web-pages
- On-line resources
- Computers in Science
- WEB 2.0
- Wikis



E-teaching aids – can you manage without?

It not just about digital tools..

- Modern digital technology offer a long range of tools to improve (or change) our life..
- .. this include how we teach!
- But good teaching is *not guaranteed* by applying E-learning tools..
- .. **we have to do it based on good pedagogical principles and methods!**
- In the end, it's our students learning outcome who defines how good the teaching is!

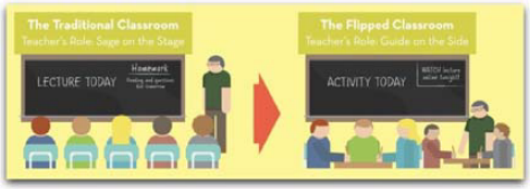
What We Want...

Basically, we want to provide the best teaching ever given - all the time!

An Example: Flipped Classroom

- Flipped classroom is an ***instructional strategy*** and a type of ***blended learning*** that reverses the traditional educational arrangement by delivering instructional content, often online, outside of the

Source: Wikipedia (of course!)



An Example: Flipped Classroom

- Flipped classroom is an ***instructional strategy*** and a type of ***blended learning*** that reverses the traditional educational arrangement by delivering instructional content, often online, outside of the classroom and **moves activities**, including those that may have traditionally been considered homework, **into the classroom.**

Source: Wikipedia (of course!)

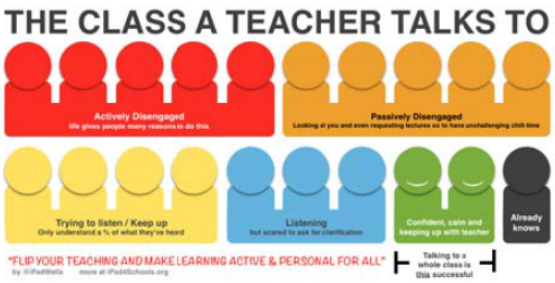
Flipped Classroom

In a flipped classroom, *students:*

- *watch online lectures,*
- *collaborate in online discussions,*
- *carry out research at home*
- *engage in concepts in the classroom with the guidance of the instructor.*

Source: Wikipedia

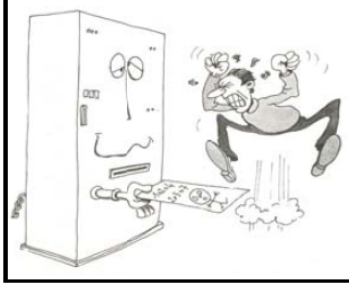
We must keep up with evolution..



From article "Stop teaching - start learning!"
http://ipad4schools.org/2014/09/08/stop-teaching-start-learning/

You Need to Master the Technology..

- Whichever way you want to teach, except traditional (and most likely ineffective) lecturing, you must master the technology .. .. at least good enough to use it!



Computer education can be frustrating until you learn how to communicate with the technology..

E-learning is not for free ..

- Most teachers who use e-learning tools ***do not save time, money or resources*** ..
- .. but the student's **engagement and learning outcome increases**!
- .. and some of the more **boring parts can be removed** (e.g. like correcting exercises).
- Teaching is also **more flexible**, both for students and teachers.
- **Most importantly, more engaged students are a lot more fun to teach!**

CINCH E-learning tools

Included in the CINCH project (WP3) are a range of e-learning tools and packages:

- Stand alone e-learning modules on selected topics
- Remote controlled lab exercises (RoboLab)
- Computers in Education (CiE) exercises
- Simulations of selected topics to be used in teaching or self-study.

RoboLab Remote Operated RadLab for Teaching Radiochemistry

CINCH

Sharing Good Teaching Tools

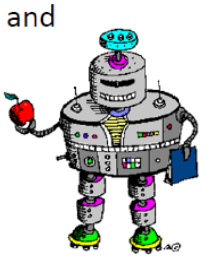
- Obviously, it is too much work to develop sophisticated methods and equipment individually.
- There is a lot of good teaching material which are inaccessible to teachers outside the home institutions (and sometimes even to fellow teachers within the institution).
- CINCH have developed an arena for sharing and co-developing teaching material:

NucWik Nuclear and Radiochemistry Teaching Material Wiki

Technology Established

- NucWik is up and running..
- Moodle platform is up and running..
- RoboLab exercises are up and running..

How should we use the technology to teach NRC?



Example: Using CINCH e-tools

Task: Teach students neutron activation analysis!

- Introduce concept (nuclear reactions, cross-section, etc.) ← Moodle
- Student calculation exercise and data look-up ← NucWik
- Explain experimental parameters and restrictions (n-sources, fast/slow neutrons, shielding, rad. protection, multiple components in sample, etc.) ← Moodle
- Simulation exercise: Two components activated (^{107}Ag and ^{109}Ag) + background. Learn how to analyze the data! ← Simulations
- RoboLab exercise: Perform activation of silver with 12s, 24s, 48s, 72s and 144s irradiation time. ← RoboLab

Example: Using CINCH e-tools

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- Analysis and interpretation: Analyze data to find R_0 for both ^{108}Ag and ^{110}Ag, take uncertainty into account. ← Moodle

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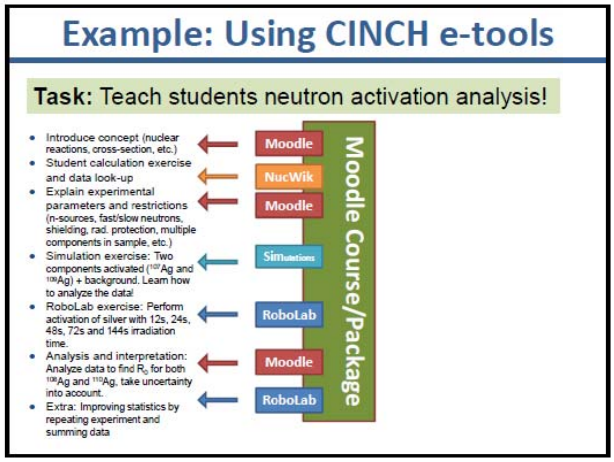
- Extra: Improving statistics by repeating experiment and summing data. ← RoboLab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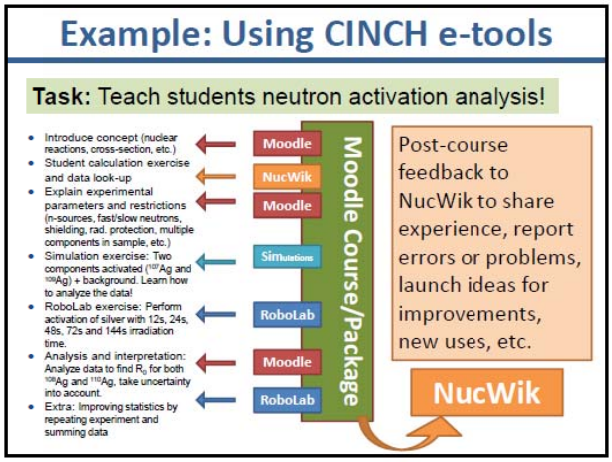
Moodle
NucWik
Moodle
Simulations
RoboLab
Moodle
RoboLab
Moodle Course/Package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Moodle
NucWik
Moodle
Simulations
RoboLab
Moodle
RoboLab
Moodle Course/Package
Post-course feedback to NucWik to share experience, report errors or problems, launch ideas for improvements, new uses, etc.
NucWik


NucWik Hands-on
NucWik Nuclear and Radiochemistry Teaching Material Wiki

10 APPENDIX 6: SLIDES INTRODUCING NUCWIK

These slides were presented by Prof. Jon Petter Omtvedt, University of Oslo to introduce NucWik before the NucWik Hands-on session.

Schedule – Morning Session

- **Introduction to CINCH E-learning Tools** (45 min)
  Jon Petter Omtvedt, UiO
- **NucWik Hands-on workshop** (2½ hours)
  J.P. Omtvedt (and H. V. Lerum), UiO
  - Session A: Introduction
  - Session B: Using material from NucWik in your own teaching
  - Session C: Contributing material to NucWik
- Lunch 12:30-14:00 (free)

Site for sharing *Teaching Material*

Schedule – Session A: Introduction

- **The NucWik concept** (15 min):
  - What is a Wiki (video + explanation/comparison to Wikipedia).
  - The idea behind NucWik – sharing NRC teaching material.
- **A first look at NucWik** (hands-on, 15 min):
  - Is login needed?
  - How do I navigate/find topics/material?

Schedule – Session B: Using NucWik

- **Providing feedback** (20 min)
  - **Hands-on**: Get a user name
  - **Hands-on** - Learn how to provide feedback (using the page comment feature of wikispaces)

Schedule – Session C: Contributing

- **How to organize your material and how to integrate it into existing material** (hands-on, 30 min)
- **How to work together with other NucWik contributors** (hands-on, 30 min)
- **Uploading your own material** (hands-on, until lunch)

NucWik

The basic idea

- Most of us do not have the time, energy, knowledge, etc. to make "fancy teaching stuff" ...
- ... we don't even have time to make the normal stuff!
- There is a lot of teaching material around, but most of it are not openly available or are even "protected" and/or hidden.
- Why not share it?

Some Facts about Wikis

- A Wiki is a tool for joint document development and sharing.
- The most well known example is Wikipedia.
- The quality of a Wiki largely depend on active users.

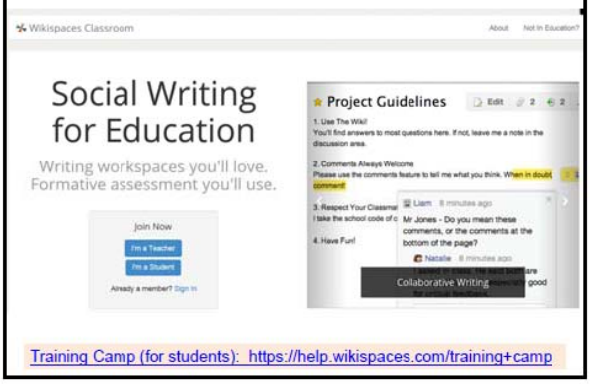
About NucWik:

- Developed as part of the FP7 CINCH project.
- Runs on the commercial WikiSpaces server.

http://nucwik.wikispaces.com/

Wiki Explained in Plain English..

www.wikispaces.com



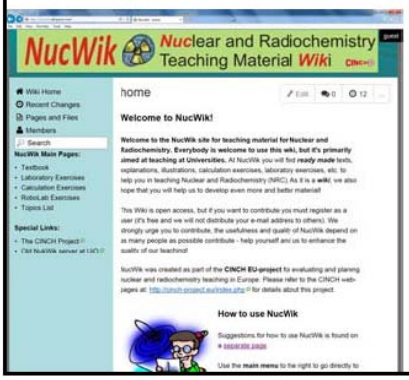
Training Camp (for students): https://help.wikispaces.com/training+camp

Site for sharing *Teaching Material*

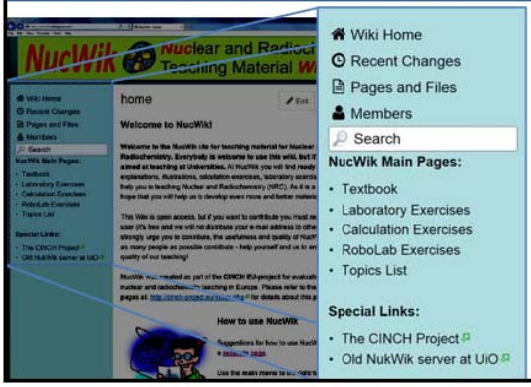
NukWik:

- No reading or downloading restrictions.
- Must register to upload material or edit content.
- It's free!

NucWik – Main Menu



NucWik – Main Menu



Understand this ..

- NucWik is not a ready made, polished product in its final form.
- It is primarily a tool for active collaboration between teachers.
- You want it better? Then make it so!
- It can be used in many ways, most likely in ways not initially planned for.

It's up to you!

Let's get hands-on!

Quality Control

- A "peer review" system will be implemented.
- "CINCH Approved" guaranties that a document has been review by other teachers, approved by CINCH.
- Documents will be clearly labeled.

CINCH APPROVED

Can everybody edit?

- You must be a registered user to create and edit documents.
- However, everybody can comment on a document, e.g. in order to:
  - report errors
  - suggest improvements
  - communicate to others how it was used
  - or simply just say thank you!
- If you do not want to upload yourself, we will much appreciate material we can upload!

Not anymore (due to spam)

Do you want to use it?

We can help you get started:

- By visiting and help you to "learn the ropes".
- We will make on-line courses.
- Arrange dedicated courses (e.g. like what we do today here in Helsinki)

Explore NucWik

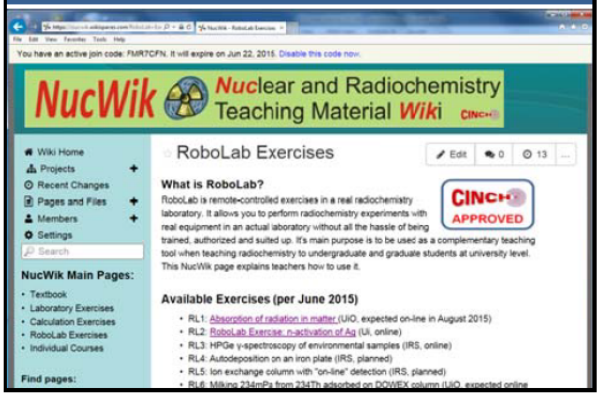
http://nucwik.wikispaces.com/

Start up your laptop and look around and explore!

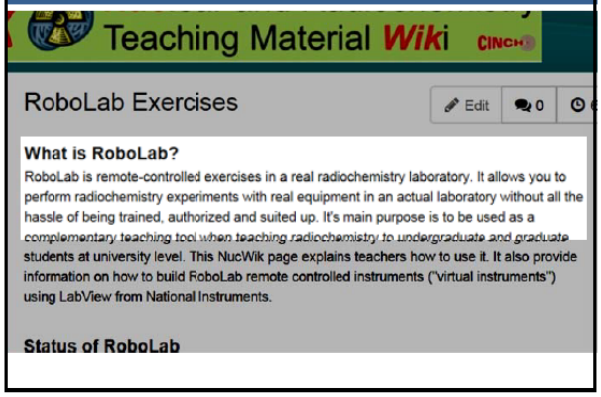
11 APPENDIX 7: SLIDES INTRODUCING ROBOLAB

These slides were presented by Prof. Jon Petter Omtvedt, University of Oslo to introduce the RoboLab concept.

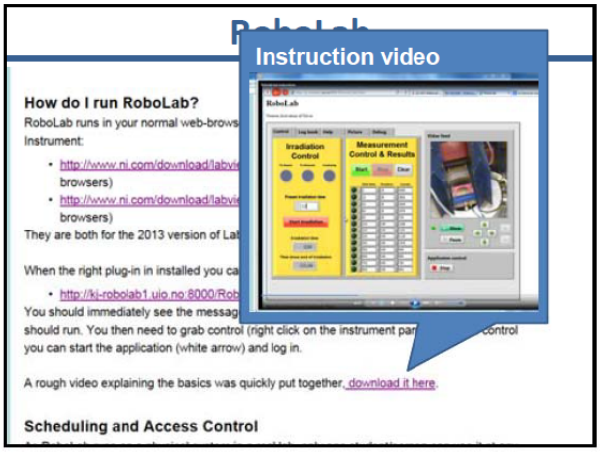
RoboLab



RoboLab

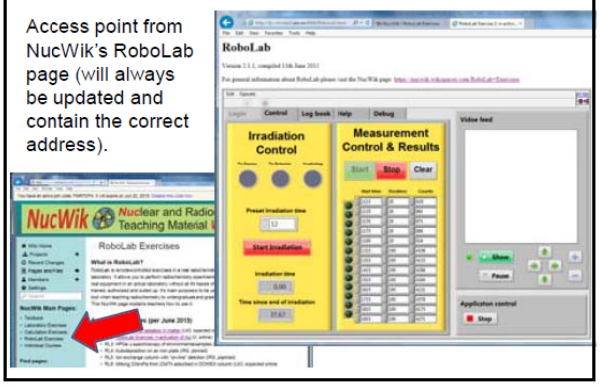


RoboLab



RoboLab2 – n-activation of Ag

Access point from NucWik's RoboLab page (will always be updated and contain the correct address).



RoboLab Requirements

- RoboLab is running under LabView from National Instruments
- You do not need LabView installed (expensive and huge), but you must have the LabView run-time plug-in for your browser (free and small)
- Get the plug-in (for LabView 2014 SP1) from ni.com:
  http://www.ni.com/download/labview-run-time-engine-2014-sp1/5199/en/
  (it is linked from the NucWik RoboLab-page)
  You need admin rights to install it and you must register with NI (free)!

Existing and Planed Exercises

RL1: Absorption of γ radiation in matter (UiO, expected on-line in August 2015)

RL2: RoboLab Exercise: n-activation of Ag (UiO, online)

RL3: HPGe γ-spectroscopy of environmental samples (IRS, online)

RL4: Autodeposition on an iron plate (IRS, planned)

RL5: Ion exchange column with "on-line" detection (IRS, planned)

RL6: Milking 234mPa from 234Th adsorbed on DOWEX column (UiO, expected online in January 2016)