An On-line Platform for Sharing Expertise and Good Practice in University Chemistry Teaching

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Bill Byers, Iwona Maciejowska and Anthony Smith

6th Eurovariety in Chemistry Education 2015, Tartu, June 30 – July 2
Latour S. (2014), Starfish animation
https://www.youtube.com/watch?v=H6Y1rdOppk8
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https://www.youtube.com/watch?v=H6Y1rdOppk8
Freeman (2014), review of 225 studies in STEM: The results raise questions about the continued use of traditional lecturing as a control in research studies, and support active learning as the preferred, empirically validated teaching practice in regular classrooms.

It is time
- to use activating teaching methods
- to change from sage on the stage to guide on the side

Change teaching?

Teacher’s beliefs about good teaching
Usual practice (logistics) of the institution
Students’ expectations about university study

RESOLUTIONS? ME??
JUST WHAT ARE YOU IMPLYING? THAT I NEED TO CHANGE?? WELL, BUDDY, AS FAR AS I’M CONCERNED, I’M PERFECT THE WAY I AM!
How can we support chemistry lecturers to learn about activating teaching methods and to be able to change?
Five moments of learning

1. When learning how to do something for the first time (New)
2. When expanding the breadth and depth of what we have learned (More)
3. When we need to act upon what we have learned adapting performance to a unique situation (Apply)
4. When problems arise, or things break or don’t work as intended (Solve),
5. When we need to learn a new way of doing something, and need to change skills deeply ingrained in practices (Change).

Bob Mosher, 2012
Learning situations in a life long professional development in teaching and teaching design

- Mostly peer-to-peer
- Lecturers’ teams – curriculum renovations
- Teaching innovation projects (ICT)
- On the job learning from experts
- Mentoring of young lecturers
- Workshops for teaching staff
- Meetings and conferences about education
- Research in teaching and learning
How can we support chemistry lecturers to learn about activating teaching methods and to be able to change?

By stimulating and supporting sharing of expertise and good practice in university chemistry teaching.
Content

■ Motivation
■ Context
■ What, why, how
  □ Content and funcionality
  □ Examples
■ Concusions
Context

Role of European Chemistry Thematic Network (ECTN)
ECTN – European Chemistry Thematic Network

ECTN consortium brings together all the actors in chemistry/chemical engineering in Europe through the membership of the partner associations.

Partners from 29 EU countries (including the Republic of Serbia and Makedonia), and 6 different Third Countries.

- universities
- national chemical societies
- European Chemical Industry Council (CEFIC, which represents nearly 30,000 small, medium and large companies)
- European Association for Chemical and Molecular Sciences (EuCheMS - whose members are all the European National Chemical Societies),
- three spin-off companies,
- one of the seven institutes (IRMM) of the European Commission Joint Research Centre (knowledge transfer).
ECTN – European Chemistry Thematic Network

ECTN Two sets of basic tasks

1. Mapping and enhancing education
   - Existing teaching methods (describing, analyzing, comparing)
   - New teaching methods (defining, experimenting with)
   - Disposal of existing teaching material (databases).
   - New teaching material (producing or updating, translating, disseminating)
   - Quality assurance activities

2. Facilitating European Co-operation:
   - Assessing the quality of European co-operation
   - Developing tools for co-operation (ECTS, new models of co-ordination, Europeanization strategies)
   - Promoting the production of European modules

ECTN Approach

Working groups
Targets of the ECTN working group: *Towards Excellence in School and University Teaching 2012-2015*

- teacher quality
- improvement of school and university teachers training
- outcomes of the working group
  - best practice examples of important areas of chemistry teacher training, and a self-evaluation test for these areas
  - a database of expertise in different teaching methods used at university level
What, why, how

What do we need for designing teaching?
Lecturers practitioners – life long learning

To design sound teaching we need

- resources of knowledge
- input by experts
- exchange with peers
- questions / answers (discussion)

A database is not enough – we need a knowledge network
What knowledge lecturers need for teaching?

- **T**: Tools to make it more effective
- **C**: Content
- **P**: How to teach

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TPACK framework

Mishra & Koehler, 2006

www.tpack.org
What, why, how

What does the ECTN database Expertise in Chemistry Teaching need to provide?
What, why, how

Working group defined headings and sub-topics

• **descriptions** of teaching methods
  • 15 main headings
  • 52 sub-topics
• contact to **people** (personal profiles) with expertise about specific teaching methods
Content of ECTN database Expertise in Chemistry Teaching

http://starfish.innovatievooronderwijs.nl/information/77/

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Content of ECTN database Expertise in Chemistry Teaching

Projects

- **Projects** (1)
- Events (1)
- Glossaries (3)
- Information (47)
- People (69)
- Questions (2)

**Projects**

- **Lets Improve Our Assessment Competences (LIOAC)**

Motivation for this project (goals) Increasing the quality of education by increasing the quality of the educational outcomes due to using better techniques of learning...
People in ECTN database Expertise in Chemistry Teaching

Most recent or alphabetical

- **Arne van der Gen**
  Expertise in interactive teaching, context-, problem- and research learning and quality assurance

- **Sanjiv Prashar**
  Expertise in interactive lecturing, context- and problem based learning and teaching labs

- **Karen Moss**
  Expertise in context learning, effective learning in science, and research based learning.

- **Peter Childs**
  Expertise in context based learning, research based learning, evidence based research in teaching and learning.

- **Odilla Finlayson**
  Expertise in engaging pedagogies, context- and problem based learning.
Topics of ECTN database Expertise in Chemistry Teaching

Expertise in Chemistry Teaching - ECTN database
Posted by @NatasaBrouwer on April 3, 2014, 10:50 a.m.

Technology EChemTest
Content Chemistry
Context/Topic ECTN ECTN

About
Expertise in Teaching Chemistry in Higher Education database is started by the EChemT European project (funded by the European Commission) of the ECTN (European Chemistry Thematic Network) and is one of the outcomes of the working group Towards Excellence in School and University Teaching.

The ECT - ECTN database is established to connect the lecturers and their teaching expertise to share in the European context.

You can request your profile in the database and an account to be able to contribute with your knowledge and experience in chemistry teaching (scroll or See also).

Go to --> List of descriptions on topics relevant to university chemistry teaching.

Go to --> Expertise in Chemistry Teaching Database and find all items added to the database - the latest are added on the top.

People - personal profiles of the chemistry lecturers from different universities who are willing to share their experience.

Information - teaching methods.

Search in all public documents published on Starfish. These can also be from other disciplines than chemistry. Log in with your Starfish account to find only the documents which are connected to ECTN. To do so select the community where you search.

Description of the database
The working group dealing with the database has identified 15 main headings which include Interactive Lecturing, Practical Work and Group Work and these have been divided into a total of 52 sub-topics. For example, Interactive Lecturing has been further divided into the seven topics: Incomplete Handouts, Questioning, Lecture Breaks, Audience Response Systems (Clickers), Flipped Lectures, Online Classrooms and Lecture Demonstrations. It is hoped that the database will initially serve two independent roles. Firstly, the brief descriptors of topics related to teaching will provide an easy point of reference for new or experienced lecturers wishing to enhance or expand their teaching and secondly the database will provide details of individuals with their expertise in each of the topics described. This will enable universities or individual lecturers to easily collaborate.

http://starfish.innovatievooronderwijs.nl/information/77/
List of topics relevant to university chemistry teaching

About

The EC2EIN working group Towards Excellence in School and University Teaching is building a collection (database) of teaching methods and pedagogical issues relevant for university chemistry teaching.

The descriptors will (are) connected to the people in the ECTN network with the specific expertise in order to stimulate exchange of knowledge and experience in Europe. At this moment only a part of descriptors is already available but the project is still going on.

Welcome to participate with your expertise! This will make it possible for lecturers to obtain information and take inspiration how to design and develop high quality and sound teaching programmes.

List of topics

1. Interactive Lecturing (see list of related methods and people to contact)
2. Practical work (see list of related methods and people to contact)
3. Group Work (see list of related methods and people to contact)
4. Context Based Learning (see list of related methods and people to contact)
5. Teaching with Technology (see list of related methods and people to contact)

See also

1. Request ECTN personal profile and Starfish account
2. Expertise in Chemistry Teaching - ECTN database
3. Claim a descriptor which you wish to contribute to the ECTN database

Questions

http://starfish.innovatievooronderwijs.nl/information/395/
List of topics

1. Interactive Lecturing (see list of related methods and people to contact)
2. Practical work (see list of related methods and people to contact)
3. Group Work (see list of related methods and people to contact)
4. Context Based Learning (see list of related methods and people to contact)
5. Teaching with Technology (see list of related methods and people to contact)
6. Research Based/Led/Focused/Informed Teaching (see the list of related methods and people to contact)
7. Work Based Learning (see list of people to contact)
8. Tutorials
9. Assessment (see list of related methods and people to contact)
10. Pedagogical Issues (see list of related issues and people to connect)
11. Quality Assurance (see list of related issues and people to connect)
12. Evidence-based Teaching Methods
13. Analogy-based Teaching (see list of related methods and people to connect)
14. Learning Outcomes and Constructive Alignment
15. Supporting Learners (see list of related methods and people to connect)

You can contribute to this list with your Starfish account (request account). To distribute the work within the community please claim your descriptor. On this page you will see which descriptors are already claimed. Note that you are most welcome to write descriptors also about any related methods to the methods on the list!

Claimed descriptors:

http://starfish.innovatievooronderwijs.nl/information/395/
Follow Topic **Interactive teaching** in the ECTN database

![Starfish interface](image-url)

**Interactive lecturing**

Lecturing dates back to medieval times and the founding of Europe’s earliest universities. Initially, lectures amounted to little more than a ‘lecturer’ standing at the front and reading a book to...

- **Flipped Lecture (Flipped Classroom)**
  - About Traditional lectures consist predominantly of the transmission of information to a generally passive student audience. This is achieved predominantly using verbal forms of communication...

- **Audience Response Systems (Clickers)**
  - Although the benefits of active learning in higher education are now widely accepted, many students, having been spoon-fed throughout their secondary education, seem reluctant to adapt to the change...

- **Lecture Breaks**
  - It is well known that the traditional didactic lecture places students in a very passive role. Often they were only required to listen to what the lecturer was saying and copy down anything that was...

- **Teaching by Questioning**
  - Although questioning is usually associated with assessment it can also be very effective at...
Descriptor in ECTN database Expertise in Chemistry Teaching

Interactive lecturing
Posted by @BillByers on March 16, 2014, 8:55 p.m.

Pedagogy: Demonstrations, Flipped Lectures, Incomplete Hand-outs, Lecture Breaks, Online Classrooms, Questioning
Technology: Audience Response Systems
Content: Chemistry
Context/Topic: ECTN, Student-Centered Teaching

About
Lecturing dates back to mediæval times and the founding of Europe's earliest universities. Initially, lectures amounted to little more than a 'lecturer' standing at the front and reading a book to the students who were merely required to listen to the reader and write down the information imparted word for word. At this time, of course, books were very rare and students were very unlikely to have direct access to a text. Fortunately, times have changed, books are now readily available at reasonable prices and the arrival of the digital age and the internet means that information is both plentiful and readily available to those who know where to look. These days, therefore, no longer be a need to make copies of books by listening and writing. Nevertheless, lecturing in its traditional form has remained a major component of many university chemistry teaching programmes and at its worst still amounts to little more than the lecturer reading a prepared manuscript to the assembled audience. In fact, throughout the twentieth century, lecturing tended to be focused primarily on a process of simple information transfer, what we might call a 'Passive Diffusion Model of Knowledge Transfer'. This teacher-centred approach involved the lecturer showering knowledge over the students who were merely required to absorb it. Teachers believed that they had knowledge to impart and the better they lectured the better their students would learn. Unfortunately, learning like teaching is an active process, so denying learners this very passive role tends to be ineffective. If we wish to improve student learning we, therefore, need to increase their involvement in the learning process. Any approach which seeks to increase student involvement beyond simply listening and writing is an example of Interactive Lecturing and has the potential to enhance both the quantity and the quality of the learning it promotes.

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Personal Profile in ECTN database

Expertise in Chemistry Teaching

Dr. Bill Byers
Expertise in interactive teaching, independent learning methods, learning outcomes, constructive alignment

About Bill Byers
Affiliation: Ulster University, United Kingdom

Bill Byers taught chemistry on a variety of courses from sub-degree to postgraduate level to a wide range of students studying many disciplines for over 40 years. He has continued teaching, researching and examining part-time since retiring as a senior lecturer in Chemistry at the University of Ulster (United Kingdom) at the end of 2008. He is an active member of the European Chemistry Thematic Network and its working groups.

Teaching Interests

Teaching Expertise
Incomplete Hand-outs, Questioning, Audience Response Systems, Open-ended experiments, Group Laboratory Classes, Context and Problem Based Learning, Traditional Group Work, Case Studies, Role play, Study Diaries, General Pedagogy, Reflection and Metacognition, Learning Outcomes and Constructive Alignment.

=> Download Bill Byers CV and the full list of his publications

Relevant publications about university teaching and learning

To ask a question you need to log in. It can on any page.
You can send him an e-mail.
Log in ECTN database Expertise in Chemistry Teaching

If you don't have Starfish account yet you can request it by filling in the ECTN form on Starfish.
Ask Question in ECTN database Expertise in Chemistry Teaching


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Ask a question

Title:

Text:

Tags:
Answer Question in ECTN database Expertise in Chemistry Teaching

Research skills
The idea or practical work can be organized individually or in collaborating groups. Which approach is in your experience more effective when students are expected to develop research skills?

Posted by @NatasBrouwer on Feb. 18, 2015, 12:02 a.m.

Pedagogy PracticalWork

Answers
Bill Byers
Feb. 19, 2015, 2 p.m.

This is an interesting but complex question. In favourable circumstances I believe that research skills are better fostered within a group project. A group project will in general allow more interesting and more complex problems to be investigated. Research skills require that ideas be formed, questioned and revised. A small group project can provide a suitable vehicle for individuals to form, exchange, defend and modify ideas and is likely to result in consideration of a wider range of concepts. Working in such groups can also be enjoyable and motivating and help to encourage perseverance. However, in practice, there are a number of potential problems associated with group work. In particular, any discrepancy that arises is likely to reduce both motivation and learning. Often people feel that other members of the group are not pulling their weight or a group may be controlled by a dominating individual. Both these problems can be guarded against when the roles and tasks required from individuals are made clear at the on-set. It is also found that intragroup cohesion is helped where an element of intergroup competition is present. Group projects also create greater difficulty with assessment than do individual projects. It is therefore important that details of any accompanying assessment are made clear to students at the start of group projects.

Natas Brouwer
Feb. 20, 2015, 10:36 p.m.

Dear Bill, many thanks for this explanation! Natas Brouwer

Give answer
Text:

See also
Natas Brouwer
Bill Byers

Questions
Edit Profile in ECTN database Expertise in Chemistry Teaching

Dr. Natasa Brouwer

Email: N.Brouwer-Zupancic@uva.nl

Website: http://www.uva.nl/contact/medewerkers/item/n.brouwer-zupancic.html?f=Brouwer

Affiliation: Faculty of Science, University of Amsterdam, The Netherlands

I am a senior consultant in university science teaching, specialized in ICT (University Teaching qualification programme (Dutch BKO)), Amsterdam EChemTest center. I am the coordinator of the ICT and teaching innovation (ICTO-FNWI Programmaad, ICTO-FNWI bibo) at the Faculty of Science, University of Amsterdam.

I am an active member of the European Chemistry Thematic Network working groups.

Relevant publications about university teaching and learning

Contribute to ECTN database Expertise in Chemistry Teaching

- claim a descriptor to contribute to the ECTN list
- add your good practice, event or project that you have about a specific chemistry teaching method
Contribute to ECTN database Expertise in Chemistry Teaching

Starfish beta Search Browse Feedback Contribute Account

Information

Title

Text

Tags

Links

Available Links Chosen Links

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Conclusions

ECTN database Expertise in Chemistry Teaching

- connects knowledge to experiences to people
- user friendly to publish
- accessible to exchange ideas: Q/A
- specific for chemistry lecturers
- what? how? who can help me?
- Chemistry in European context and connected to universities (ECTN)
- is searchable and explorable
- you can make your own list of knowledge to follow
- can grow and regenerate (as a starfish)
- proof-of-concept
Join the Expertise in Chemistry Teaching - ECTN database

Fill in the Personal profile form which you can find:
- Scan the QR code or
- Find the URL in ECTN Flyer or
- Find the link on the ECTN pages or
- Search “ECTN database” in Google or

Or just send an e-mail to natasa.brouwer@uva.nl with your request to join or if you have any other questions.
Starfish

Starfish animation
https://www.youtube.com/watch?v=H6Y1rdOppk8

About Starfish
http://starfish.innovatievooronderwijs.nl/glossary/340/

http://starfish.innovatievooronderwijs.nl/
Thanks for your attention!