



How Does e-Chemistry Work?

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A solution to improve the students' interest for science study assumes ICT tools introduction in the teaching process. The SOP HRD 61839 project "**Looking Towards the Future – Professional Training of the Teaching Staff to Use Modern Digital Resources in Efficiently Teaching of Chemistry – e-Chemistry**", financed from the European Social Fund aims to develop ICT skills for professors who teach chemistry and technology-related subjects in the K-12 system. Even if computer usage in the learning-teaching processes is very successful, putting it into practice is rare in Romania. The project included two training components: a five-day module for developing basic IT skills and an eleven-day module for applying the newly acquired skills in chemistry teaching. A set of educational pilot resources were developed and used intensively during the training sessions organized in all 41 counties and capital of Romania. Although the project has its own learning content management system suitable for on-line and off-line training activities, all sessions were face-to-face organized in order to offer a maximum tutorial support to participants. The digital resources are focused on main subjects from organic, inorganic, analytic, physical chemistry and electrochemistry, being presented to the target group by trainers from the University Politehnica of Bucharest and University Politehnica of Timisoara. Since July 2011 until May 2012 more than 2500 trainees completed the two training programs. e-Chemistry is supposed to bring together people who experience similar difficulties in their teaching activity and are eager for finding solutions to teach more, better and faster.

1. Introduction

A low interest of the young generation towards sciences and engineering is nowadays a common fact, and most countries are facing with (Kargiban and Siraj, 2009). On the other hand, it is generally accepted that this generation adapts quicker and easier to the rapid changes taking place in the contemporary society (McCowan, 2002). Still, parents and educators complain frequently that youths don't study and read "as we used to do". Student interest revival for studying sciences becomes a stringent task for all people involved in education. One possible solution assumes introduction of ICT tools in the teaching process. This can lead to increase in motivation, attraction for study, exploration and problem-based learning. Given these realities, University Politehnica of Bucharest together with **Sivico S.A.** and University POLITEHNICA of Timisoara submitted the SOP HRD 61839 project "**Looking Towards the Future – Professional Training of the Teaching Staff to Use Modern Digital Resources in Efficiently Teaching of Chemistry – e-Chemistry**", financed from the European Social Fund. The project aims to "educating the educator" in facilitating e-learning as a teaching approach for improving K-12 students performances.

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Clearly, interaction is the key component of e-learning. e-Learning offers opportunities for all three kinds of interaction (learner-teacher, learner-content, and learner-learner) through features commonly built into learning management systems, such as automated instruction or communication tools. e-Chemistry has added new valences of e-learning by the fact that, by its specificity, has generated the premises for another type of interaction, namely teacher-teacher. This is possible because of the collaborative feature of the platform developed within the project. In addition to sharing educational digital content to its users, trainees and trainers, it also allows local and national interactions between them. By the fact the program has allowed, by its evolution, a feedback, it can be said that it has generated a fifth type of interactivity, namely teacher-content developer. A collaborative project is a good way to promote interactions among online community participants (Onofrei et. al., 2005). Without highly qualified teachers, e-learning may not have a positive impact on student performance. Technology in itself apparently can become a barrier for educators who are embracing e-learning. There are teachers frustrations "with a new and frequently cranky technology" that is time consuming, dispiriting, and challenging. They should be offered the opportunity to connect with pedagogical and technological methodologies, as well as strategies necessary to become successful e-learning teachers (Oliver, 2005). K-12 educators participating in e-learning projects must be emotionally prepared to accept and adapt to ongoing changes, including technological changes in hardware systems and curricula modifications.

2. Project educational portal

The project portal was designed and developed with two major components: an educational platform, AeL, created by **Siveco** and further refined by a continuous feed-back from all participants, and an enrolling and information structure split into several useful modules: an accounting system, electronic forms and automatically generated files, a scheduling section, a versatile database containing all applicants and able to generate various statistics. The portal public zone contains the menus: *Home/Acasă*, *About the project/Despre proiect*, *Events/Evenimente*, *Courses enrolling/Înscrieri cursuri*, *Training courses/Cursuri de formare*, *Contact/Contact*. The main page (*Home/Acasă*) is shown in Figure 1, having the background menu selected. The portal private zone, accessible by *user name/nume utilizator* and *password/parola*, allows the applicants to enroll in the training program (*Courses enrolling/Înscrieri cursuri* menu). The login section is shown in Figure 2. As an applicant fills in the fields in *Personal data/Date personale* submenu and saves an electronic form, the *Enrolling forms/Formulare de înscriere* are automatically generated (Figure 3).

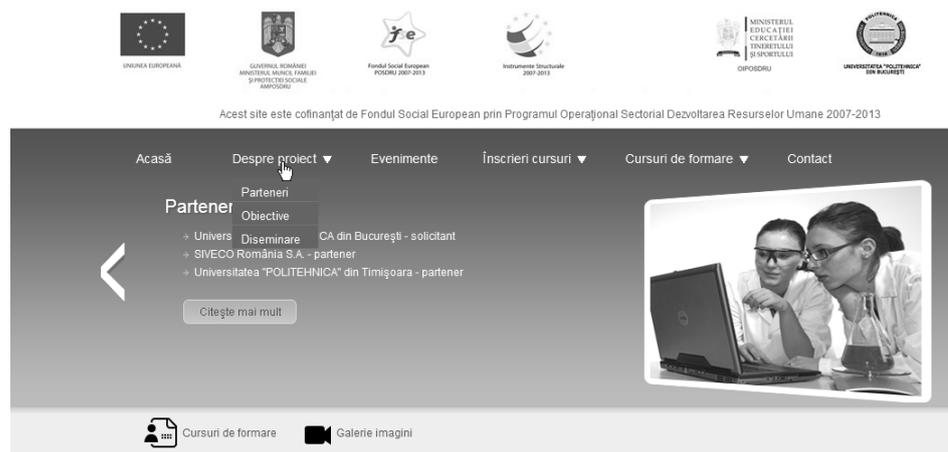


Figure 1: Portal menus

Va rugam sa apelati pentru orice tip de problema legat de portal/platforma educationala la Centru support:
 callcenter@siveco.ro
Telefon:
 TELVERDE - 0800 0800 05 (gratuit in retea RomTelecom)
MOBIL
 - 0372 11 44 00 (retea Vodafone), apelabile din orice retea la tarifele operatorului dumneavoastra.
Program:
 Luni - Vineri 8:00 - 20:00
 Sambata-Duminica 9:00 - 17:00

Noutăți

Calendarul activităților de evaluare

Calendarul activităților de evaluare pe perioada 01 - 18 decembrie 2011

Programarea grupelor

TIC - CHIMIE INOVARE ÎN PREDAREA ȘI ÎNVĂȚAREA CHIMIEI PRIVIM CĂTRE VIITOR - e-Chimie

derulate în cadrul proiectului POSDRU/87/1.3/S/61839 Privim către viitor - Formarea profesională a cadrelor didactice pentru utilizarea resurselor informatice moderne în predarea eficientă a chimiei - **e-Chimie aflat în a paisprezecea lună de desfășurare.**

Cursurile de formare se derulează după următorul program: [Mai mult](#)
[Citește arhiva.](#)

Callutare

Autentificare

Numele de utilizator: *

Parola: *

Autentificare

[Cont nou](#)
[Recuperare parolă](#)
[Probleme de autentificare](#)

Utilizatori Online

Utilizatori: 3921
 Utilizatori autentificați: 3
 Vizitatori: 0

Cei mai mulți vizitatori la un moment dat: 383 persoane
 (Joi, 5 Aprilie 2012)



Universitatea Politehnica din București



SIVECO Romania



Universitatea Politehnica din Timisoara

Figure 2: Login section

The image shows two parts of the website interface. On the left is a dark navigation menu with the following items: 'Înscrieri cursuri', 'Cursuri de...', 'Date personale', 'Formulare înscriere', and 'Date personale'. A mouse cursor is pointing at 'Date personale'. On the right is the 'Date personale' form, which includes fields for: 'Nume: *', 'Prenume: *', 'Inițiala tatălui: *', 'Gen: *' (with radio buttons for 'masculin' and 'feminin'), 'CNP: *', 'Seria B.I./C.I.: *', 'Număr B.I./C.I.: *', 'Unitate emitență B.I./C.I.: *', and 'Data emiterii B.I./C.I.: *' (with dropdowns for 'Zi', 'Luna', and 'Anul'). Below the form is a 'Data nașterii: *' field with similar dropdowns. At the bottom of the page, there is a 'Formulare de înscriere' section with a list of documents for download, including 'CERERE DE ÎNSCRIERE' and 'DECLARAȚIE PRIVIND PRELUCRAREA DATELOR PERSONALE'. A note mentions downloading Adobe Reader for PDF files.

Figure 3: Courses enrolling/Înscrieri cursuri menu, Personal data/Date personale, and Enrolling forms/Formulare de înscriere submenus

The portal private zone username and password will be used to access the educational platform. The platform offers in its public area the theoretical knowledge for the chemical curriculum required in the K-12 system. Trainees are supposed to prove their newly acquired skills by preparing presentations on specialized subjects based on the most suitable new instruments. All presentations authored by teachers will be stored in the platform, in order to be used in future teaching activities. During the training courses offered by the project, all trainees are encouraged to create their own lessons and evaluation tests, to exchange information and share experiences with other participants and to contribute to build-up a collaborative virtual community spread across the entire country.

3. Project target group

Professors who teach chemistry and technology-related subjects in the K-12 system represent the project target group. Training sessions have been organized in 8 regions containing all 41 counties and Bucharest capital of Romania, as shown in Figure 4. The project includes two training components: a five-day module for developing basic ICT skills and an eleven-day module for applying the newly acquired skills in chemistry teaching. The trainees have been organized in groups containing between 15 and 25 persons. The digital resources, focused on main subjects from organic, inorganic, analytic, physical chemistry and electrochemistry, have been presented to the target group by trainers from the University Politehnica of Bucharest and University Politehnica of Timisoara. 2538 teachers completed the two training programs and were certified in the July 2011 – May 2012 time interval. Figure 5 illustrates the distribution in time of certified trainees. Maximum numbers of certified teachers were reached in October 2011 (503) and November 2011 (523). The decrease in the following months shows only that almost the entire target group is fulfilled. The main project indicators achieved until May 2012 relating to certified teachers are as follows: 2340 women, 835 teachers in rural schools, 345 in technical education, 1332 in inferior secondary cycle (forms 7-10) and 861 in superior secondary cycle (forms 11-12). Distribution of these indicators on regions is shown in Figure 6. A large number of certified trainees teaching in urban schools and high-schools as well as in inferior secondary cycle can be noticed.



Figure 4: Regions of project implementation: North-East (NE), North-West (NW), West (W), South-West (SW), South (S), South-East (SE), East (E) and Center (C)

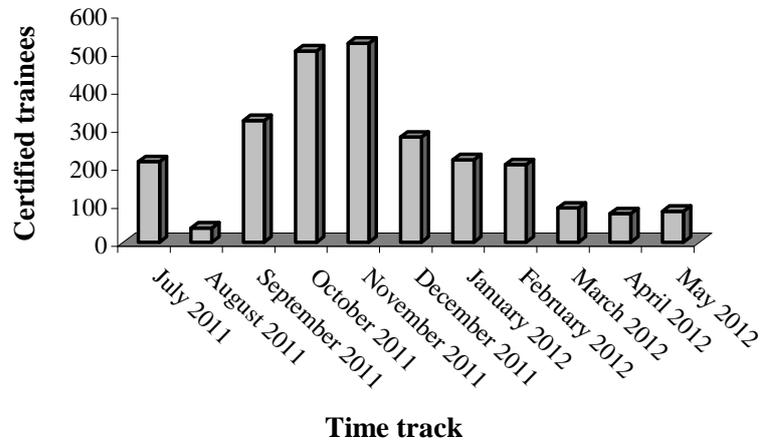


Figure 5: Distribution in time of certified trainees

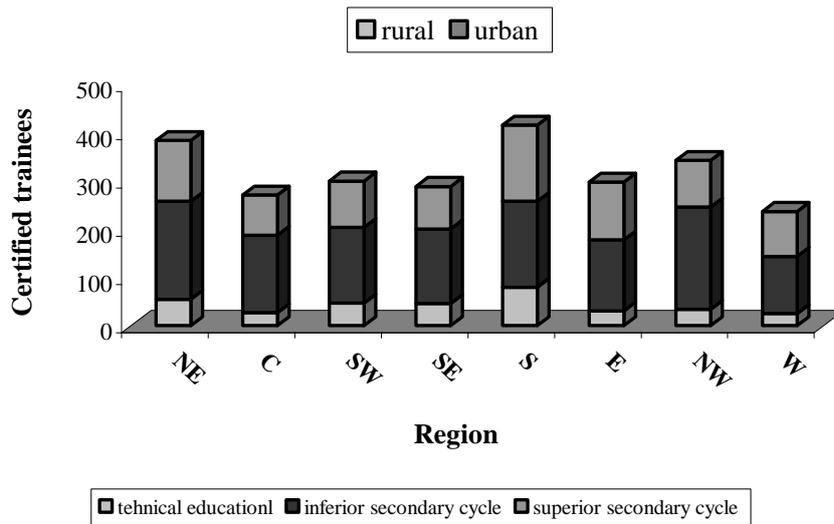
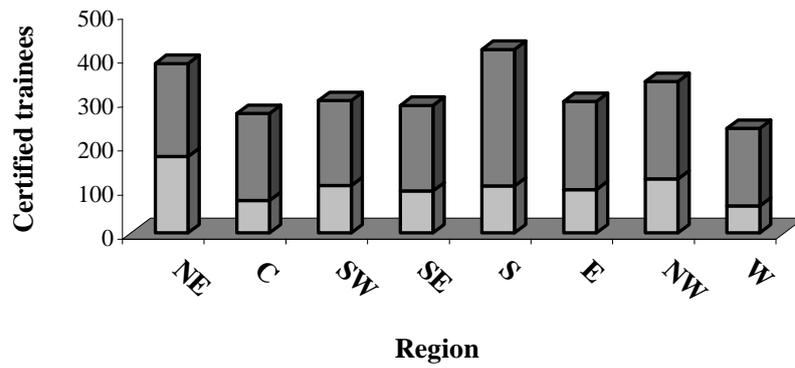


Figure 6: Distribution of certified trainees with type of cycle and activity area

4. Conclusions

University Politehnica of Bucharest together with SIVCO S.A. and University Politehnica of Timisoara proposed and managed a project focused on professional training of the teaching staff to use ICT-related skills in teaching efficiently and more appealingly chemistry. The target group consisted of professors teaching chemistry and technology-related subjects in the K-12 system in Romania. The digital resources, focused on main subjects from organic, inorganic, analytic, physical chemistry and electrochemistry, have been presented by trainers from the University Politehnica of Bucharest and University Politehnica of Timisoara. The training sessions, including a five-day module for developing basic ICT skills and an eleven-day module for applying the acquired skills in chemistry teaching, have been organized in all 41 counties and capital of Romania. During the training courses, the trainees involved in the project have created their own educational resources and evaluation tests, have exchanged information with other participants, trainees and trainers, and have contributed to build-up a collaborative virtual community spread across the entire country. During July 2011 – May 2012 time span more than 2500 trainees completed the two training programs and were certified. The project managed to form and develop ICT skills of teachers, which could lead to an increase in education quality, as well as in interest of students for chemistry and chemical engineering.

References

- McCowan J., 2002. An Integrated and Comprehensive Approach to Engineering Curricula Part Two: Techniques. *Int. J. Enging. Ed.*, 18, 638-643.
- Onofrei R, Josceanu A M, Postelnicescu P, Pleșu V., 2005. e-Learning Interactivity Approach in Chemical Engineering Education. *Chemical Engineering Transactions*, 7, 431-436.
- Oliver M., Trigwell K., 2005. Can “blended learning” be redeemed?, *E-learning*, 2, 17–26.
- Kargiban Z. A., Siraj S., 2009. The Utilization and Integrating of ICT in Chemistry Teaching in Iranian High Schools. *World Applied Sciences Journal*, 6(11), 1447-1456.