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complete the chemical studies to be a good teacher of chemistry. The continuous improvement and training are equally important. The teacher should do this to share his passion of science with his or her students.

References

[1] Kulawik T., Litwin M.: Chemia Nowej Ery. Program nauczania chemii w gimnazjum: www.mrat.pl
[2] Dz. U. z 6.02.2012 Nr 0, poz. 131.
[3] Batycka B.: Program nauczania chemii w gimnazjum: www.profesor.pl
[4] Hejwowska S., Marcinkowski R.: Chemia. Program nauczania dla liceum ogólnokształcącego (w zakresach podstawowym i rozszerzonych), liceum profilowanego i technikum (w zakresie podstawowym), 2001, Wydawnictwo Pedagogiczne OPERON, Rumia; ISBN: 83-87518-43-3.
[5] Kulig J., Bednarczyk J.: Rola doświadczeń w procesie nauczania chemii. Wybrane doświadczenia chemiczne dla licealistów, Aparatura Badawcza i Dydaktyczna, Vol. VIII, No. 4, 2003, p. 313.
[6] Kulig J., Bednarczyk J.: Doświadczenia chemiczne, Forum Nauczycieli Liceum 2, 45.50, 2003.
[7] www.gazetaprawna.pl, www.britamer.pl

An Overview of Teacher Training in Portugal

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Abstract

This paper presents an overview of teacher's training in Portugal concerning initial teacher training (ITE), specialized training and in-service teacher training, as considered by the Portuguese legislation. A special emphasis was given to training in information and communication technologies (ICT) and to teaching of experimental sciences for primary school. Moreover, chemistry teacher's training was contextualized in this scenario. Presently ITE corresponds to level 7 of the European Qualifications Framework (master degree). It is a career-long professional development, where research-based and in context practice are important features. Nevertheless the implicit valorisation of the teaching career arising from Bologna process implementation, a master degree is needed for all teaching levels; a lack of motivation to pursue teaching careers is generally noticed in Portugal as a consequence of the actual context of a surplus and unemployment among the new teachers. Following ITE, in-service training allows teachers to complement, deepen and update their knowledge and professional competences. This is an important measure for in-service long date teachers' and particularly relevant for the ones that, following teacher career reorganization, had to readapt to new curricula and even new teaching subjects.

1. INTRODUCTION

Teacher education is an important issue being teacher quality identified as an important factor to enhance students' outcomes. From initial teacher training (ITE) to continuous training, the development of a quality culture is important. In that context the coordination between ITE and continuous professional development is an important topic. Moreover, an effective way to raise educational quality can be achieved by properly define initial teacher education curricula and provide adequate train (actualization) to teachers that are already in-service. According to the Portuguese

legislation [1], teachers' training is organized in three different categories: (1) Initial training, (2) Specialized training, and (3) In-service training. This work will give an overview of teacher's training in Portugal focusing the three points addressed by the legislation. A special emphasis was given to training in ICT and to teaching of experimental sciences for primary school. Moreover, chemistry teacher's training will be contextualized in this scenario.

2. INITIAL TEACHER TRAINING

In Portugal and following the Bologna process, initial teacher training (ITE) comprises a first cycle, typically of 3 years (180 ECTS) characterized by a broad training in basic education for class teachers and a field of knowledge oriented training (e.g. chemistry, mathematics, biology etc.) for subject teachers. Following this first cycle, a master degree is required. The duration of this second cycle is of 1-2 years for class teachers. Table 1 specifies the duration of the second cycle for class teachers according to the target teaching level. Class teacher's education follows a concurrent model being subject and pedagogical matters taught simultaneously, whereas subject teacher's education follows a consecutive model [2]. For this last case, a second cycle with a typical duration of 1.5-2 years (90-120 ECTS), where professional qualifications are acquired, is needed.

Teaching level	Second cycle duration
Kindergarten or basic education (1st cycle)	1 year (60 ECTS)
Kindergarten and basic education (1st cycle)	1.5 years (90 ECTS)
Basic education (1st and 2nd cycles)	2 years (120 ECTS)

Table1. Duration of the second cycle for class teachers (based on [2]).

ITE in Portugal is currently [2]:

- A career-long professional development being the formation provided by Higher Education Institutions (HEIs) and continued by in-service teacher education;
- A research-based level of qualification, where a master degree is required (level 7 of the European Qualifications Framework);
- A qualification acquired in a teaching context that comprises supervised practice and internship;
- A qualification supported by a curriculum driven to learning outcomes.

In Portugal, ITE formation can be provided by public and non-public HEIs. As an example, Table 2 presents an overview of the institutions offering first cycles for class teachers according to the data published on the website of DGES-Direзro Geral do Ensino Superior - Ministry of Science, Technology

and Higher Education (data for higher education access 2013) [3]. The chosen study area was "Education sciences and teacher's training". The following key specific subjects have been chosen: mathematics, "physics and chemistry", and "biology and geology". According to this website, the number of class teachers graduated during the period comprised between the school year 2000/2001 and 2009/2010, was 17405. 2% of these teachers are unemployed (note: only teachers enrolled in a job centre are taking into account), being 21% of them looking for the first job [3].

Professional qualification	Type of HEI institution	Number of courses offered
Class teachers	University	10
	Polytechnic	13
	Non-public	11

Table2. Distributions of first cycles offer for class teachers (based on [3]).

In what concerns chemistry teachers, the formation pattern corresponds to a subject oriented first cycle followed by a second cycle (master) mainly focussed on professional qualifications. The second cycle entitled "Education in Physical-chemistry Sciences" (2 years, 120 ECTS) aims to qualify teachers, both in physics and chemistry sciences, to teach basic (3th cycle) and secondary education levels [4]. To access this second cycle the applicants need to have 120 ECTS in the two subject areas (physics and chemistry) including no less than 50 ECTS in each of them. Examples of the first cycle could be Chemistry, Physical-Chemistry Sciences and Biochemistry, among others. This second cycle will provide training in physics and chemistry didactics, as well as, in educational psychology.

One of the positive aspects arising from the Bologna process implementation seems to be the valorisation of the teachers' socio-professional status based on the assumption of a higher professional qualifications (master degree), a curriculum driven to learning outcomes, and the valorisation of teacher practice. Neverthless, in a socio-economical context, the teaching profession in Portugal is nowadays characterized by a surplus and unemployment among the new teachers. As a consequence, recruiting of student teachers in ITE programmes is becoming difficult and a lack of motivation to pursue teaching careers is generally noticed [5].

3. SPECIALIZED TEACHER TRAINING

Specialized training is intended to provide qualification in complementary educational functions. According to [6], they can be summarized as follows:

- Special Education (provided by adequate Higher Education Institutions);
- Administration and inspection activities in schools, socio-cultural

animation, basic education for adults, among others, having in mind the development of the education system (provided by Higher Education Institutions).

4. IN-SERVICE TEACHER TRAINING

In-service training or continuous training allows teachers to complement, deepen and update their knowledge and professional competences. The training actions can be selected by the schools, according to the identified needs of their teachers or, simply, result from the individual initiative of the teacher [1]. It is important to mention that it has a direct impact in their careers, being one of the factors considered to access mobility and progression. In Portugal, the continuous teacher's training accreditation, in what concerns institutions involved, training actions and evaluation process is centralized in the "Conselho Científico-Pedagógico da Formação Contínua" [7].

5. TEACHING EXPERIMENTAL SCIENCES FOR PRIMARY SCHOOL

In this work, we will give an important example in teachers' training, not only for its National dimension, but also by recognizing the importance of science teaching in primary school. In Portugal, a very ambitious National Training Program in Teaching of Experimental Sciences for Primary School Teachers, was developed between 2006 and 2010, involving 5141 primary school teachers, 4245 schools and 149359 students [8]. Its impact is also huge, because it is very well supported by several documents (training plan, training programs, progress reports, final reports, external evaluation reports), publicly available, and though, to our knowledge only available in Portuguese, they can constitute very important sources of information for the development of similar programs in other countries. Another very important output of this training program was the teaching resources developed, including a didactic guide for teachers and a notebook for students to register their observations. In the case of Physical-Chemical sciences, a few can be mentioned:

- - Exploring... Floating liquids
- - Exploring... Dissolution in liquids
- - Exploring... Physical changes of state
- - Exploring... Sustainability in the Earth

A final report is also available that evaluates the impact of this training program [9].

6. ICT AND TEACHER TRAINING

One of the main activities of the project is "to provide school teachers with existing resources and materials (particularly online sources) to teach Chemistry in a more innovative, attractive and interactive approach, focusing on the exploitation of ICT and the valorisation of enquiry based methods and solutions" [10]. Therefore, it is very important to know the actual situation in Portugal relatively to the use of ICT in education, including the teachers' training in the ICT area.

An important study was published in 2003 [11], concerning the use of ICT by Portuguese teachers at all levels with the exception of higher education. The following main conclusions were drawn by the authors:

- The majority of the Portuguese teachers own a computer and use it in teaching related activities (prepare classes, worksheets, tests, internet searches, etc.). Nevertheless, its use in direct interaction with students was found more limited. This was found particularly valid for primary school teachers;
- Self-training and courses promoted by the Ministry of Education were generally adopted/attended by the Portuguese teachers;
- Internet, and particularly email, was more used by 3rd cycle and high school teachers. Young male teachers were the main users;
- Portuguese teachers, without distinction of age and levels taught, need and wish to have training in ICT applications. They generally have more positive than negative attitudes towards ICT. However, many female teachers show negative attitudes.
- Two main obstacles were refered for integrating ICT in schools: the lack of technical means and human resources.

A long way was crossed since 2003. Following, a strong investment is being carried out by the Ministry of Education, according to the Portuguese Technological Plan for Education, approved in September 2007, encompassing several objectives [12]:

- Provide technological infrastructures to schools;
- Make available online contents and services;
- Promote the ICT skills of the schools' community.

A very recent interesting work [13], precisely studies this thematic in the European context, making a survey in 2011, (over 190 000 online questionnaires posed to students, teachers and head teachers) in several schools across Europe (EU27, Croatia, Iceland, Norway and Turkey). Two topics will be highlighted here, with a special focus on the Portuguese context:

- Schools' ICT infrastructure: the results show that the percentage of

students at grades 4 and 11 by school, in terms of having digital equipment, is above the EU average.

• The importance of a well-trained teacher in ICT is mentioned by the authors as they say "Students' use of ICT for learning during lessons is related to teachers' confidence in their own ICT competences, their opinion about the relevance of ICT for teaching and learning and their access to ICT at school". This work analysed the percentage of students that are taught by "digitally confident and supportive teachers" reaching the following values: 20–25% for the EU average. In Portugal, the values are: 30 to 50% of students at grades 4 and/or 8 and more than 45% in grade 11.

6. CONCLUSIONS

Presently, and following Bologna process implementation in Portugal, the initial training education corresponds to level 7 of the European Qualifications Framework (master degree). It is a career-long professional development, where research-based and in context practice are important features. In particular for chemistry teachers, ITE comprises a first cycle (subject oriented type) followed by a second cycle (master) mainly focussed on professional qualifications.

During professional life, teachers can access in-service training to complement, deepen and update their knowledge and professional competences with a direct impact in their mobility and progression. In Portugal, the continuous teacher's training accreditation, in what concerns involved institutions, training actions and evaluation process is centralized in a Scientific-Pedagogical Council (Conselho Científico-Pedagógico da Formação Contínua).

A special emphasis was given to training in information and communication technologies and to teaching experimental sciences for primary school. The first point was strongly supported by the Portuguese government that has developed several initiatives in this field. An example is the "Technological Plan" that resulted in well-equipped schools and the organization of several training opportunities for teachers.

References

[1] Decreto-Lei N° 41/2012 de 21 de Fevereiro (available at Diário da República Eletrónico - http://dre.pt/).

[2] Campos, B., Bologna and Initial Teacher Education in Portugal. In: Hudson, B., Zgaga, P., Astrand, B. (Eds.), Advancing quality cultures for teacher education in Europe – Tensions and opportunities, Umeå School of Education, Umeå University, Sweden, 2010, pp. 13-32.

[3] DGES – Direção Geral do Ensino Superior (http://www.acessoensinosuperior.pt/) (accessed on February 2013).

[4] Decreto-Lei N° 43/2007 de 22 de Fevereiro (available at Diário da República Eletrónico - http://dre.pt/).

[5] Flores, M.A., Curriculum of initial teacher education in Portugal: new contexts, old problems, Journal of Education for Teaching: International research and pedagogy, 37:4, 461-470 (2011).

[6] Lei n.° 49/2005 de 30 de Agosto (available at Diário da República Eletrónico - http://dre.pt/).

[7] Conselho Científico-Pedagógico da Formação Contínua (http://www.ccpfc.uminho.pt) (accessed on February 2013).

[8] Programa de Formação em Ensino Experimental das Ciências (PFEEC) para Professores do 1.° Ciclo do Ensino Básico (http://www.dgidc.min-edu.pt/outrosprojetos/index.php?s=directorio&pid=93) (accessed on November 2012).

[9] Martins, I.P., Vieira, C.T., Vieira, R.M., Sá, P., Rodrigues, A.V., Teixeira, F., Couceiro, F., Veiga, M.L., Neves, C., Avaliação do impacte do programa de formação em ensino experimental das ciências: um estudo de âmbito nacional, Ministério da Educação e Ciência, Direção-Geral da Educação, 2012.

[10] Chemistry is All Around Network Project (http://chemistrynetwork.pixel-online.org/info/project.php) (accessed on February 2013).

[11] Paiva, J., Paiva, J.C., Fiolhais, The use of information and communication technologies by portuguese teachers. In Llamas-Nistal, M.; Fernandéz-Iglesias, M.J.; Anido-Rifon, L. [ed. lit.] - Computers and Education – Towards a Lifelong Learning Society. Kluwer Academic Publishers: Dordrecht, 2003. Cap. 20, p. 239-250.

[12] The Technological Plan for Education, (http://www.pte.gov.pt/pte/EN/index.htm) (accessed on February 2013).

[13] Wastiau, P., Blamire, R., Kearney, C., Quittre, V., Van De Gaer, E., Monseur, C., The use of ICT in education: a survey of schools in Europe, European Journal of Education, Part I, 48:1, 11–27 (2013).

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