



Chemistry (science) teaching and chemistry (science) teacher education in Europe – An ECTN survey

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for the ECTN –working group *Links with schools*

Rationale

ECTN takes care about different traditions and systems for tertiary education in chemistry. But, tertiary level studies in chemistry have to base on the pre-knowledge future students have from school education in chemistry or science. On the other hand, a lot of universities and research institutes offer links to schools, e.g., lab-work courses, teaching materials, or in-service teacher training. The *Links with Schools*-group within the ECTN tries to exchange information and ideas for both issues.

For the exchange of ideas and information on links with schools it seems to be worthwhile to be informed about different structures of the educational systems in Europe.

A lot of general information is available about the whole educational systems in most European countries, at the following webpages: www.euroeducation.net/ or www.eurydice.org/.

But, there is rare information about the system of teacher training in the field of chemistry and the time tables of school chemistry lessons. With a small survey in 21 European countries this paper offers some information about the amount of chemistry or science teaching in primary and secondary education across Europe and about the qualification one should have to become a chemistry or science teacher.

You will see a big variety.

Additional information on other more specific issues is available via the Leonardo-da-Vinci-project FACE: www.face.net.tc/.

For this survey information was collected by members of the group and beyond in Austria, Belgium (Flanders), Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, the Netherlands, Poland, Slovenia, Spain, Sweden, Switzerland, the UK

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	Ireland	Estonia	Cyprus	Lithuania	Spain	Belgium (Flanders)	Italy
Science lessons in primary science education							
Primary education lasts up to grade	6	6	6	6	6	4	6
Science is taught as ...	integrated subject	integrated subject	integrated subject	integrated subject	integrated subject	integrated subject	integrated subject
The courses are ...	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory
Science is taught on average per week by	1-5 periods	2 periods	1 period		3 periods	2-3 periods	3 periods
Comments							Science is not a definite subject, but is included as general knowledge, with emphasis on technology.
Science lessons in lower secondary education							
Lower secondary education lasts up to grade	9	9	9	9	10	6	8
Science is taught as ...	integrated subject	individual subjects	integrated subject	individual subjects	integrated subject	individual subjects	integrated/ non-integrated subject with respect to the school's profile
The courses are ...	not compulsory to all, but with respect to the school's profile	compulsory	compulsory	compulsory	compulsory	compulsory only in biology	compulsory
Science (together) is taught on average per	4-5 periods	4 periods	1 period		3 periods	2 periods	2-6 periods with respect

week by							to the school's profile
Comments							Physics is distinct; other sciences are confused
Science lessons in upper secondary education							
Upper secondary education lasts up to grade	10- 11/12	12	12	12	12	11	11
Science is taught as ...	individual subjects	individual subjects	individual subjects	individual subjects	individual subjects	individual subjects	integrated/ non-integrated subject with respect to the school's profile
The courses are ...	not compulsory	compulsory	compulsory	compulsory with respect to the school's profile	not compulsory	compulsory	compulsory
Science (together) is taught on average per week by	4-5 +periods	4 periods	1 period compulsory, 4 not compulsory		6 periods	3-6 periods	2-6 periods with respect to the school's profile
Comments	The length of the upper secondary education varies due to the fact that there is an optional Transition Year between the junior cycle (grades 7-9) and senior cycle				To study enginery, Maths and Phys are compulsory. To study Health sciences, Bio. and Chem. are compulsory.	In non-scientific study options science is taught integrated, since 2004, in the last two years of secondary schools (years 5	Physics is distinct; other sciences are confused

	(grades 10-11), which about 50% of students take.					and 6 ; ages 16-17). This is still in an experimental phase.	
Primary science teachers formal qualification							
Education is done at	Colleges of Education	Universities	Universities	Univ. of Education	Universities	Higher educational schools	Dedicated High School, now shifting to Universities
Qualification	B.A. in Educ.	B. Sc.	B.A. in Educ.	Other four years degree	Other three years degree	B.A. in Educ.	B. SC.
Compulsory in-service training programme	-	-	-	Yes	-	-	-
Comments		4 years degree, 2+3 is the upcoming system					
Secondary science teachers formal qualification							
Education is done at	Universities	Universities	Universities	Univ. or Univ. of Education	Universities	Universities of Education	Universities
Qualification	B.A. in Educ. or B. Sc.	B. Sc.	B. Sc.	B.Sc. and M.Ed. or M.Sc.	Other four years degree	B. Sc. resp. B. Sc./M.Sc	B. Sc. or B. Sc./M.Sc
Compulsory in-service training programme	-	-	Yes	Yes	Yes	Yes	-
Comments	Two routes to second level teaching: 4 year science degree + 1 year Higher Diploma in Education or integrated 4year science degree plus education qualification	4 years degree (often added by a fifth year for a second subject), 2+3 is the upcoming system				B. Sc. (lower secondary) B. Sc./M.Sc for upper secondary	

	UK	Bulgaria	Latvia	Poland	Germany	Austria	The Netherlands
Science lessons in primary science education							
Primary education lasts up to grade	6	4	6	6	4	4	6
Science is taught as ...	integrated subject	integrated subject	Integrated subject	integrated subject	integrated subject	integrated subject	integrated subject
The courses are ...	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory
Science is taught on average per week by	2 periods	3 periods	3-4 periods	3 periods	3-4 periods	2 periods	2 periods
Comments				Grade 4-6	The subject is integrated with social sciences and history		The course is taught twice a week, science is part of that
Science lessons in lower secondary education							
Lower secondary education lasts up to grade	11	8	9	9	9 or 10	8	9
Science is taught as ...	integrated subject	independent subjects	independent subjects	Independent subjects	independent subjects	independent subjects	individual subjects
The courses are ...	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory
Science (together) is taught on average per week by	6 periods	7 periods	6-7 periods	5-6 periods	4 periods	2-6 periods	4 periods
Comments				Chem + bio + phys + earth science – together 16 hours/3 years (e.g. chemistry 1st grade – 2 hours, 2nd grade – 1hour, 3 rd grade -1 hour – together 4hours of chemistry/3	Some of the German countries: integrated science with respect to the school type (basic, middle, grammar school)	Ranges with respect to the school's profile	There are changes intended towards an integration.

				years)			
Science lessons in upper secondary education							
Upper secondary education lasts up to grade	13	11 or 12	12	12	13	12	12 (11)
Science is taught as ...	independent subjects	independent subjects	independent subjects (2-3 years) or independent subjects in 3 year integrated sc. program (1+1+1)	independent subjects	Independent subjects	independent subjects	individual subjects and integrated
The courses are ...	not compulsory	compulsory	One of above combinations compulsory with respect to the schools profile	compulsory with respect to the school's profile	courses in 1 or 2 sciences are compulsory	compulsory	Integrated course compulsory, others within profile
Science (together) is taught on average per week by	6 per subject, max 3 subjects	10 periods	6-7 periods or 3 periods	1-4 per subject	3 or 5 per course	4-9 periods	2 periods compulsory, 6 in profile
Comments				Basic – 12- 16 hours/3 years, 'Specialisation' e.g. biology + chemistry not fixed in details e.g. 6-9 hours of chemistry/3 years + the some of biology			There is also a type of secondary ed. That goes onto 11. Answers have been given for 12.
Primary science teachers formal qualification							
Education is done at	Colleges of education, or	Univ., Univ. of Educ. or Depts. f	University Univ. of	Univ. or Univ. of	Univ. (Univ. of	Pedagogical Academy	College of education

	universities	Inform., Qualification and Training of Teachers (DIQTs)	Education	Education	Education in one of the German countries)		
Qualification	B.Educ., BA or BSc	B. Sc. often combined with M. Ed.	B. Sc. combined with professional degree in educ.	B.Sc.	4 years degree	3 years degree	B.A. in educ.
Compulsory in-service training programme	Yes	Yes	Yes	Yes	Yes	Yes	Yes, quite a bit actually
Comments					The system shifts to BA/MA: B.A. and M. Ed..		Does not qualify for admission to master degree
Secondary science teachers formal qualification							
Education is done at	Universities	Univ. or Univ. of Education or Depts. f Inform., Qualification and Training of Teachers (DIQTs)	University or Univ. of Education	Univ. or Univ. of Education	Univ. (Univ. of Educ. in one of the German countries for lower sec.)	University for grammar school Pedagogical Academy for basic school	Universities for upper secondary Colleges of education for lower secondary
Qualification	BA or BSc + teaching cert	B. Sc. and M. Ed.	B. Sc. or M. Sc. and Prof. degree in Chem. Ed.	B. Sc. resp. B. Sc./M. Sc	4 or 5 years degree		B.A. in Educ. (lower sec.) M.Sc. (upper sec.)
Compulsory in-service training programme	Yes, but not necessary in science	Yes	Yes	Yes	Yes	-	Ye
Comments	The teaching cert is a separate one year course after the BSc			B. Sc. (lower secondary) B. Sc./M. Sc for upper secondary	The system shifts to BA/MA. B.Sc. and M. Ed. A difference in the degrees: 4	A difference in the degrees: 3 years degree for basic school; 4 years degree for grammar school	We have two levels of teachers. The lower level is qualified up to grade 9, the

					years degree for basic and middle school; 5 years degree for grammar school		M.S. is qualified for higher level.
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	Croatia	Denmark	Czech Rep.	Sweden	Slovenia	Switzerland	Hungary
Science lessons in primary science education							
Primary education lasts up to grade	4	6	5	9	5	6	4
Science is taught as ...	integrated subject	integrated subject	integrated subject	integrated subject	integrated subject	integrated subject	integrated subject
The courses are ...	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory
Science is taught on average per week by	2 periods	1-2 periods	2 periods	1 period	3 periods	4 periods	2 periods
Comments	Science is not a definite subject, but is included as general knowledge			Basic schools are from grade 1 to 9	1-3-th grade: the subject is integrated with social sciences 4-5-th grade: the subject is integrated with technical science		
Science lessons in lower secondary education							
Lower secondary education lasts up to grade	8	9	9	9	9	9	8
Science is taught as ...	individual subjects	integrated subject	independent subjects	integrated subject	integrated (grade 6/7), individual subjects (grade 8/9)	integrated subject	independent subjects
The courses are ...	compulsory	compulsory	compulsory	compulsory	compulsory	compulsory	
Science (together) is taught on average per week by	7 periods	4 periods	6 periods	2 periods	2-6 periods	4 periods	4 periods
Comments	Individual courses are: Biology, Chemistry, Physics, Technical Education			Basic schools are from grade 1 to 9	2 periods grade 6, 3 periods grade 7, 5,5 periods grade 8, 6 periods grade		

					9		
Science lessons in upper secondary education							
Upper secondary education lasts up to grade	12	12	13	12	13	12	12
Science is taught as ...	individual subjects	independent subjects	independent subjects	Independent or integrated with respect to the school's profile	individual subjects	independent subjects	independent subjects
The courses are ...	compulsory and compulsory + optional depending on the school's profile	compulsory	compulsory	compulsory or not compulsory with respect to the school's profile	compulsory	compulsory	compulsory in 9/10; with respect to the school's profile in 11/12
Science (together) is taught on average per week by	6-12 periods with respect to the school's profile	> 5 (see comments)	6 periods	with respect to the school's profile	2-6 periods with respect to the school's profile	4 periods	4-6 periods
Comments	Periods taught and the selection of courses varies greatly depending on the type of secondary school	400 periods of science is compulsory during the first two years of upper secondary school, but the students can choose to have more science			Some schools have science subjects only 1 year, most of them 3 years.		
Primary science teachers formal qualification							
Education is done at	Teacher Education Academy	College of Education	University of Education	Universities	Universities (Faculty of Education)	University of Education	Teacher academies
Qualification	B.Sc.	B. A. in Educ.	M. Ed. (5	B. A.	4 years	3-years	B. A.

			years degree)		degree	degree	
Compulsory in-service training programme	Yes	-	Yes	-	Yes	-	Yes
Comments				A lot of teachers have a M. Ed.			
Secondary science teachers formal qualification							
Education is done at	Universities	Universities for upper secondary Colleges of education for lower secondary	Universities or Universities of Education	Universities	Universities (Faculty of Education - Departments of different subjects)	Universities for upper secondary Universities of education for lower secondary	Universities of Education/ Teacher Academies/ Universities
Qualification	B.Sc.	B. A. in educ. (lower sec.) M.Sc. (upper sec.)	M. Sc. Ed. (5 years degree)	B.A. and M.Ed.	4 years degree	4-years degree (lower sec.) B.Sc./M.Sc. (upper sec.)	B. A. in educ. (lower sec.) M.A. (upper sec.)
Compulsory in-service training programme	Yes	-	Yes	-	Yes	Lower sec: No Upper sec.: Yes	-
Comments					Teachers are qualified for two subjects (e.g. math-phys., phys.- chem., chem.- biol. ...)		B.A. and M.A. includes science and pedagogy