

Support to strengthening the higher education system in Azerbaijan



Twinning project ENI/2018/395-401

Mission Report

Short-Term Mission on Activity 1.5. Provide recommendations for improvement of education standards for qualification for programmes in the priority areas (incl. legislative arrangements) with a view to describing achievements based on competences and skills, considering the AzQF

(October 14 - 18, 2019)

1. Name and Function of the Expert:

Full name of expert

Ms. Dace Namsone, Latvia

A handwritten signature in blue ink, appearing to read "Dace Namsone".

Signature

2. Objective and Tasks of the Mission:

The mission is carried out within the framework of:

COMPONENT 1: SELECTED NATIONAL EDUCATION STANDARDS ARE ALIGNED TO INCLUDE A COMPETENCE-BASED FOCUS

Activity 1.5. Provide recommendations for improvement of education standards for qualification for programmes in the priority areas (incl. legislative arrangements) with a view to describing achievements based on competences and skills, considering the AzQF

Benchmarks for this activity are:

- **State standards for selected study programmes (Chemistry state standard) are revised**, with a view to describing achievements based on competences and learning outcomes, considering AzQF;
- **Other relevant documents/ methodology materials are prepared.**

3. Time schedule of the mission:

Date and Time	Activity
Monday, 14 th of October 2019	Meeting with RTA Ms. Elizaveta Bydanova and Ms. Vusala Gurbanova, Component Leader I, Senior Advisor at Higher Education Department, Ministry of Education. Discussions on the working tasks during the mission, the form of the deliverables. Discussion about current situation and the expected recommendations.
Tuesday, 15 th of October 2019	Deskwork on analysis of state standard of higher education for Chemistry teacher study program (2014) and recommendations for the new standard for the Chemistry Teacher study program.
Wednesday, 16 th of October 2019	Meeting with the representatives from the Azerbaijan State Pedagogical University and Baku State University and Ms. Ms. Elizaveta Bydanova in the Azerbaijan Pedagogical University.
Thursday, 17 th of October 2019	Meeting in the Azerbaijan State Pedagogical University. Discussions about improvements needed in standard with professors and lectures from Chemistry teachers study program. Observation of classes for students (teaching Methodics of Chemistry and Curriculum). Meeting with Deputy Dean from Faculty for Biology and Chemistry PhD T. Gasimov. Meeting in the Baku State University with Dean of Faculty of Chemistry prof. A.Azizov and Head of Chemistry Education department. Discussion about the changes needed in the study standard and recommendations suggested. Visit in laboratories and research centres of faculty.
Friday, 18 th of October 2019	Meeting in the Ministry of Education. Final discussion on the results of the meetings during the mission. Presentation of the recommendations for further improvement of the standards HEI and activities for the implementation of the standard relevant for the Twinning project.

4. Relevant Background Information/State of Affairs regarding the mission

1. Classification of Bachelor and Master level programs in Azerbaijan
2. Standards of Bachelor level Chemistry Teacher, in Physics, Geography etc.
3. New Standards of higher education of Bachelor level Chemistry Teacher,in Physics, Geography etc. elaborated within the TWINNING project
4. Information about Universities offering chemistry education in Azerbaijan
5. Decree of the Cabinet of Ministers “On the approval of the ‘National Qualifications Framework for Lifelong Learning of the Republic of Azerbaijan”
6. Standards of higher education of Master level

5. Achievement of the Expected Results

Planned action was achieved.

As the main achievement of the visit can be considered suggestions elaborated for development of competences-based education content in the field of Chemistry education.

6. Unexpected Results

No unexpected results were obtained during the mission.

7. Issues Left Open After the Mission

All planned issues were done during the mission.

8. Recommendations (including recommendation for future missions)

1. Recommendations in respect to necessary transformations in State Standard of Higher Education. Chemistry Teacher. Bachelor (2014.)
 - 1.1. The analysis of current standard shows the need to create clear structure for subjects' groups and learning outcomes in subjects in accordance to the goal what university graduate chemistry teacher should be able to do. The structure: Chemistry (as science) subjects; Subjects Relevant to Chemistry; Chemistry Education Subjects; General Educational Subjects; General Subjects is recommended.
 - 1.2. Comparison of the weight every group of subjects have (study program of University of Bremen, Germany used for comparison) done. The analysis shows critically low weight of

Chemistry education subjects and their outcomes in current standard (only 5% - 6%). There is not clear arguments why the weight of general (humanitarian) subjects for chemistry teacher is higher than Chemistry education subjects. I recommend significantly increase the weight of Chemistry education subjects in Standard and decrease the weight of Chemistry subjects and humanitarian subjects.

1.3. Outcomes in the Chemistry subjects in current standard (2014) are described very detailed. At the same time they are Chemistry as classical science not student focused. The revision of the goals and content of Chemistry courses is necessary to bring more relevant content for students in the context of society needs and technology progress in 21.century according to best practice in the world. The new materials, the new methods are developed in the Chemistry labs in Azerbaijan. The oil chemistry brings a lot of environmental issues, the aspects for sustainable development should be included. The understanding about trends in contemporary chemistry should be brought in the upper secondary school level curriculum and teacher standard as new subject. The “old” courses should be revised in accordance the question what is the unique additional value from the course to chemistry teacher professional competence to teach students at school. The chemistry subjects should be split in compulsory and elective subjects.

1.4. There are only few outcomes in Chemistry education subjects in current standard. The goals and content of Chemistry education subjects should be developed in accordance with the contemporary trends in Chemistry education research in the world focusing on aspects how students learn chemistry. It is recommended to include in standard this content as courses “Chemistry Didactics I, II ” etc. with the possibility to go more in depth in Masters level programs.

1.5. The elective courses implemented in both universities like “Methodics of Teaching Organic (Inorganic etc.) chemistry” should be included as a supplementing part of Organic (Inorganic etc.) chemistry subject. The understanding of Organic chemistry and practical recommendations how to teach it to students as two parts of one subject will be helpful for becoming teachers to have more holistic picture about the specific knowledge needed to teach chemistry.

1.6. Contemporary Chemistry teaching is closely connected with usage of ICT for data logging in experiments, software for chemical experiments, for visualisation of teaching and learning process, for interactive learning and collaboration in Internet platforms etc. The update of ICT course with focus to continuous development is recommended.

1.7. The focus according to goals and priorities for chemistry teachers is recommended for general subjects (like Professional English for communication in the world academic community etc.).

1.8. The general competences mentioned in the document are really important for successful working life and career. However, it is difficult to see the differences from the competences could be developed at upper secondary school level. The added value for general competences

from the university level should be found. The current version of 10 key generic competences should be improved.

2. Recommendations in respect to staff capacity.

There were a lot of good discussions with staff members during meetings and university visits about changes necessary in standards and study process. The Dean of Faculty of Chemistry gives the information about high level of Chemistry as the science in Baku State University - evidence with 60 publications in Thomson Reiter data base coming from this faculty per year. Unfortunately, no one of them in chemical education. The clear need for more active university staff involvement in the field of research in chemistry education in the world context was expressed in both universities. In both visited institutions staff members complained that there are very limited possibilities for professional development in contemporary chemistry education field. The need for professional development (master classes, study tours, ERASMUS, English language training, international projects etc.) for lecturers of chemistry education was mentioned.

Consequently, it is advisable for Ministry of Education to allocate some additional resources for the purpose to develop the Chemistry education research and professional development to fit in the world Chemical education community (participation in international conferences, publications in international journals, academic mobility etc.) and to bring new knowledge in the country for contemporary chemistry teaching.

3. Recommendations in respect to infrastructure.

During the visit in Baku State university the investment in Chemistry as Science development was mentioned. The contemporary chemistry education will bring from schools more good scientists if the investments will go to chemistry education labs and classrooms. The university chemistry education labs should be as a model for schools how to work with sensors, data loggers etc. at school environment. ICT equipment, laboratory facilities, software, models, access to scientific literature databases etc. is an integral component of usual Chemistry teaching process now days. The infrastructure for Chemistry and Chemistry education teaching in Azerbaijan State Pedagogical university is critical. It is advisable for Ministry of Education to allocate some additional resources for the development of Chemistry education laboratories in universities as examples, modules for teachers and schools.

4. Recommendations in respect to graduation requirements

One of aspects to develop chemistry education research is to create the multilevel system of research works starting with Bachelor to Master and Doctoral students. It can be recommended to include in the study program the Bachelor thesis work in Chemistry teacher standard.

4. Recommendations in respect to the structure, content and implementation of new standard document.

Analysis of current standard and discussions with lecturers show that the standard has a high stake impact on the work of the University staff.

The gap between competence based philosophy of the new standard document and traditions in chemistry teachers study process in the universities is mentioned. I have no evidence during the mission about university staff deep understanding about competence based education philosophy and its implementation in the practice - how to promote a student-oriented approach with an active role of student in the learning process mentioned in the document. I recommend to cross the gap - make clear connections between subjects and general and professional competences and to develop support system for the implementation of the standards. Describing of key learning outcomes according to competence based philosophy for every subject included in the list could be one of the solutions. The challenge for university staff will be to develop programs, competence based course descriptions without deep understanding and practice to do this. I recommend to develop the continuous working group and support them with professional development solutions (master classes, study tours, etc.) to develop new knowledge in the field for the development of the country.

9. Acknowledgments (if any)

The expert expresses gratitude to university staff in Baku university and Azerbaijani State Pedagogical University for openness during university visits. I acknowledge the support during the organisation of the visit as well as during meetings of Elizaveta Bydanova.

Annexes

Annex 1

Table Analysis of Azerbaijani state standard subjects according to new Moduls

Area of studies	Subject group	KP	%
Chemistry	Chemistry	95	60 %
Relevant to chemistry	Relevant to chemistry	17	10%
Chemistry teaching	Methods of teaching chemistry	9	5,6%
General subjects	General Educational sciences (pedagogy, psych)	16	10%
	General humanitarian	24	15%
		161	25%
<i>Internship and final</i>		6,38	

<i>state atestation</i>			
<i>Elective subjects / Professional training ?</i>		30	

Annex 2

Table Analysis of University of Bremen, Germany study courses

Area of studies	Subject group	KP	%
Chemistry	General and practicum for teaching	9	
	Inorganic and practicum for teaching	12	
	Organic and practicum for teaching	12	
	Physical and practicum for teaching	9	
			42
Relevant to chemistry	Calculus for teaching	6	
	Physics for teaching	6	
	Experiments interdisciplinary	6	
			18
Chemistry teaching	Chemistry didactics I	6	
	Chemistry didactics II	6	
			12
General subjects	Educational Sciences	9	
Key qualification			9
<i>Internship</i>			6
<i>Bachalour thesys</i>			12
<i>Elective subjects</i>			
Subject B		72	

From:

<https://www.dbs.uni-bremen.de/studienangebot/studien-berufsfelder/natur-umwelt/detail/study/chemie-bachelor-1/>

Annex 3

Groups of courses in Helsinki university (Finland)

Basic Studies 25 cr (PED310)	Intermediate Studies 35 cr (PED320)
Studies in Education	Psychology of Learning and Development 5 cr (PED002)
15 cr	
Studies in Subject Didactics 25 cr	Planning, Implementation and Assessment of Teaching 10 cr (PED0032)
Teaching practice 20 cr	Basic Practice 10 cr (PED311)

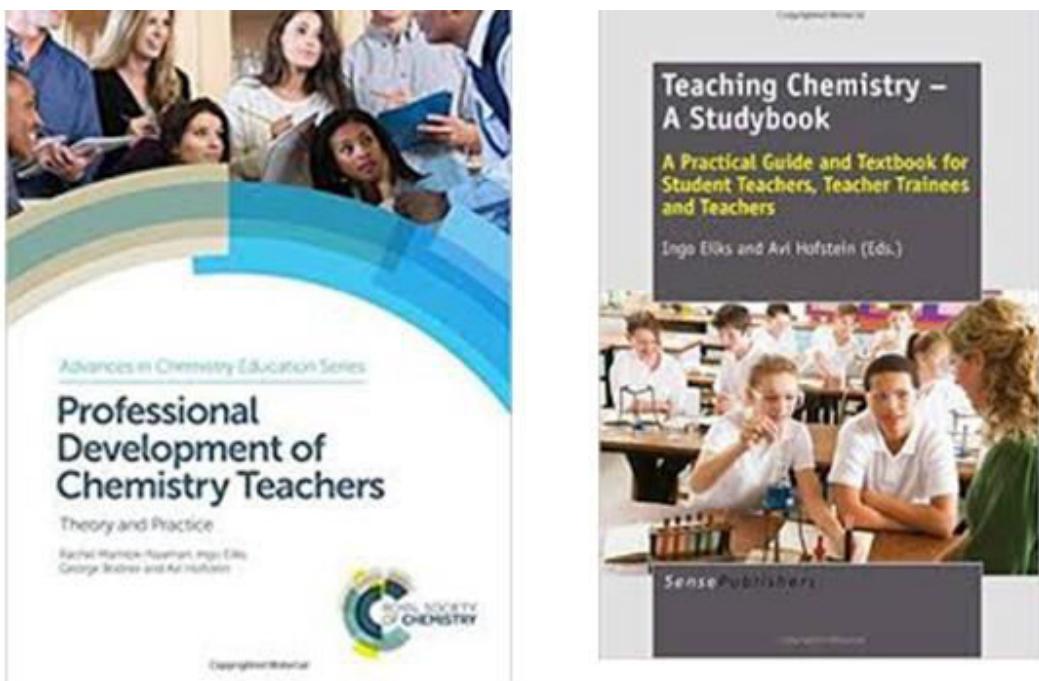
More:

<https://blogs.helsinki.fi/kem-ope/en/education/bachelor/>

<https://www.dcu.ie/courses/undergraduate/physics/science-education.shtml>

Annex 4

The books about Chemistry education recommended



Annex 5

Chemistry Education courses led by prof Ingo Eilks in University of Bremen added separately. Ingo Eilks is one of the leading researchers in chemistry education in the world. He authors more than 650 scientific publications, chapters in books, textbooks etc. in science education and specially in chemistry education.