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Culture of Democracy Through the Didactics of Chemistry

Semester Module and Session Plans for Pre-Service Training of Future Teachers

Preparing Future Teachers in the Western Balkans: Educating for Democracy and Human Rights 2019-2022

Marina Stojanovska

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ЗАВОД ЗА УНАПРЕЂИВАЊЕ ОБРАЗОВАЊА И ВАСПИТАЊА

THE EUROPEAN WERGELAND CENTRE

Preparing Future Teachers in the Western Balkans:

Educating for Democracy and Human Rights

2019-2022

Culture of Democracy Through the Didactics of Chemistry

Semester Module and Session Plans

for Pre-Service Training of Future Teachers

Marina Stojanovska, 2021

This manual is part of the project Preparing Future Teachers in the Western Balkans: Educating for Democracy & Human Rights 2019 – 2022.

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Dedicated to my students:

Iva Lazarova

Daniel Nikolovski

Elena Veljanovska

Fitim Zenuni

Suzana Jovanović and

Zulejha Alija

and teacher mentors:

Aleksandra Blaževska and

Nada Janković.

This publication is a result of the project *Preparing Future Teachers in the Western Balkans: Educating for Democracy & Human Rights 2019 – 2022,* led by the European Wergeland Centre. Funded by the Norwegian Ministry of Foreign Affairs and developed in close cooperation with the Department IPE of the Zurich University of Teacher Education, the project provides support for higher education institutions and universities in Albania, Bosnia and Herzegovina, Kosovo*[1], Montenegro, North Macedonia and Serbia, that are interested in modernizing their teacher education courses, with an aim to improve the quality of teacher education for future teachers in the region.[2] The project is implemented together with 12 universities from the region and in cooperation with the Institute for Development of Education (Albania), the Foundation, Education in Action (Bosnia and Herzegovina), the Kosovo Education Centre (Kosovo*), the Bureau for Education Services (Montenegro), the Bureau for Development of Education (North Macedonia) and the Institute for Improvement of Education (Serbia).

1 **All references to Kosovo, whether to the territory, institution or population in the text shall be understood in full compliance with the UN Security Council Resolution 1244 and without prejudice of the status of Kosovo.*

2 *The latest materials in the field of citizenship and human rights education developed by the Council of Europe and Zurich University is used as resources within the project. Examples of these materials are: Living Democracy Volumes I – VI:* www.living-democracy.com *, Reference Framework of Competence for a Democratic Culture (RFCDC):* https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=09000016806ccc07 *, and Teaching Controversial Issues:* https://rm.coe.int/16806948b6

Contents

Introduction

The module Culture of Democracy Through the Didactics of Chemistry was developed as part of the project Preparing Future Teachers in the Western Balkans: Educating for Democracy and Human Rights, funded by the Norwegian Ministry of Foreign Affairs. For the three-year duration of the project, expectations to contribute to increasing the quality of teacher education in Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia, through facilitating exchange and cooperation among universities and higher education institutions focusing on teacher training are met. The main focus was on the development of new and innovative teacher education modules, emphasizing practice-oriented teaching that promotes citizenship, democracy and human rights.

This publication contains the semester plan of a training module for pre-service teachers as well as the detailed planning of all 12 semester units (session plans). The module included specific chemistry content and attempted to integrate democratic principles and values into the education of future teachers. During the realization of this module, several materials in the field of citizenship and human rights education, developed by the Council of Europe and partners including educators from Western Balkans, were used:

- Living in Democracy Series (the website Living Democracy), an educational resource which aims to promote democracy and human rights for teachers, parents and principals.
- Reference Framework of Competences for Democratic Culture, addressing the competences that should be taught throughout the education system, divided into Values, Attitudes, Skills and Knowledge and Critical understanding.
- Teaching Controversial Issues, a publication that supports and promotes the teaching of controversial issues in schools in Europe.

This module was implemented at the institute of Chemistry, Faculty of Natural Sciences and Mathematics, Ss. Cyril and Methodius University in Skopje during the Winter semester 2020/21 (September 2020 – January 2021). Due to the COVID-19 pandemic, lectures and school practice were delivered online using Microsoft Teams (Figure 1). The first module of its kind in Macedonia, which integrates chemistry and democracy, involved six students and two teacher mentors. Moreover, within this project, a series of trainings with teacher mentors were conducted, which were organized by the EWC (Figure 2).

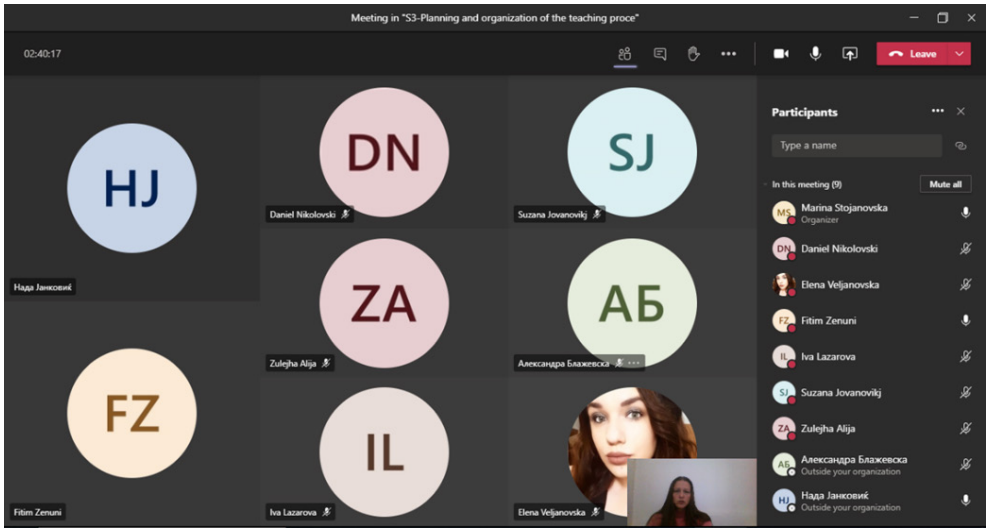


Figure 1. Implementation of the module using Microsoft Teams

Figure 2. Teacher training sessions

The Semester Module: Culture of Democracy Through the Didactics of Chemistry

This module is intended for primary and secondary school teachers through a combination of pedagogical-content knowledge and democracy. Initially, this course was designed to help future teachers after graduation, so the chemical and pedagogical contents are intertwined in the so-called pedagogical-content knowledge, which is the most important element through which students can acquire the appropriate competencies needed for the realization of chemistry teaching. Namely, being just a good chemist or just a good pedagogue is not enough. The chemistry teacher should have competencies in these two areas as a good starting point, but he/she must learn how to combine them to be a successful teacher. Usually, in this course, a school practice for students is included, which is implemented in cooperation with chemistry teachers from primary and secondary schools.

The introduction of content from democracy supports the learning process and contributes to increasing the value of this course, because the studied content is viewed from a broader and more comprehensive context. Students get the opportunity to learn about additional skills needed in the classroom, but also in everyday life, to think about the value system that each of us carries within, to understand how important it is to listen to others and to express our own opinion and attitude on a particular issue. Moreover, critical thinking is particularly important in chemistry, and the introduction of topics from democracy only reinforces the symbiosis between these two, seemingly different, areas.

The module introduces appropriate key competencies of democracy education through understanding the EDC key concepts, such as responsibility or rule of law, in context of their implementation in chemistry teaching and learning. The materials available on the website living-democracy.com are offered to university students and used to create activities within the course. The module also uses the Reference Framework on Competences for Democratic Culture (RFCDC) in order to identify the forms of applied democratic culture integrated in the classroom.

The module

General information:

Title of the module: Culture of Democracy Through the Didactics of Chemistry, Autumn 2020

Name of University: Ss. Cyril and Methodius University, Skopje

Name of Faculty: Faculty of Natural Sciences and Mathematics

Development Team: Marina Stojanovska

Implementing Lecturer: Marina Stojanovska

Number of teacher students in the training: 6

Number of classes per week: 3 classes of lectures + 6 classes of theoretical/practical student work

Number of class visits: 12 class visits at primary/secondary school (observations)

Number of lessons taught by teacher students: 48 lessons (30 at the university, 18 at primary/secondary school)

Number of Model classes taught by the lecturer**:** 3

Resources to be used:

Chemistry textbooks and other chemistry content

Didactics of Chemistry textbook

National chemistry curricula and related documents

Living in Democracy Series (living-democracy.com)

Reference Framework of Competences for Democratic Culture, Vol. 1-3

Teaching Controversial Issues

Competences for Democratic Culture addressed:

In each session integration of Chemistry Education with Didactic and Democracy content as an integral semester module is shown.

	Competences	**Descriptors**
Values	C1. Valuing human dignity and human rights	D4. Argues that all public institutions should respect, protect and implement human rights (I) D6. Expresses the view that all laws should be consistent with international human rights norms and standards (A)
	C3. Valuing democracy, justice, fairness, equality and the rule of law	D12. Argues that schools should teach students about democracy and how to act as a democratic citizen (B) D13. Expresses the view that all citizens should be treated equally and impartially under the law (B) D19. Expresses the view that information on public policies and their implementation should be made available to the public (A)

Attitudes	C6. Civic-mindedness	D33. Expresses a willingness to co-operate and work with others (B) D36. Discusses what can be done to help make the community a better place (I)
	C7. Responsibility	D39. Shows that he/she accepts responsibility for his/her actions (B) D42. Shows that he/she takes responsibility for own mistakes (I) D43. Consistently meets commitments to others (A)
	C8. Self-efficacy	D45. Expresses the belief that he/she can carry out activities that he/she has planned (B) D46. Expresses a belief in his/her own ability to navigate obstacles when pursuing a goal (I) D49. Shows confidence that he/she knows how to handle unforeseen situations due to his/her resourcefulness (A)
	C9. Tolerance of ambiguity	D50. Engages well with other people who have a variety of different points of view (B) D53. Deals with uncertainty in a positive and constructive manner (I)
Skills	C10. Autonomous learning skills	D61. Can assess the quality of his/her own work (I) D62. Can select the most reliable sources of information or advice from the range available (A)
	C11. Analytical and critical thinking skills	D64. Can identify similarities and differences between new information and what is already known (B) D65. Uses evidence to support his/her opinions (B) D69. Can use explicit and specifiable criteria, principles or values to make judgments (A)
	C12. Skills of listening and observing	D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I)
	C16. Co-operation skills	D94. Builds positive relationships with other people in a group (B) D98. Generates enthusiasm among group members for accomplishing shared goals (A) D99. When working with others, supports other people despite differences in points of view (A)
Knowledge and critical understanding	C18. Knowledge and critical understanding of the self	D106. Can describe his/her own motivations (B) D108. Can reflect critically on his/her own values and beliefs (I) D109. Can reflect critically on himself/herself from a number of different perspectives (I)

Module overview session by session:

Session 1

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation Short essay – What is your responsibility as future chemistry teacher? (homework – to be e-mailed to a professor 10.10.2020)						
Session 1 **12.10.2020** **14.10.2020**	The importance of teaching profession	Short introduction to the aims and objectives.	Responsibility (Vol. III, part 2, unit 6, lesson 1) Understanding the EDC key concept "Responsibility" in context of its implementation in chemistry teaching. Introducing the website: www.living-democracy.com	C7 – D39, D41 C10 – D62 C20 –D118	**Lecturer:** Relations of chemistry and democracy, basic criteria of democratic culture. Reads the story "Milan makes a choice" and discusses various issues with students. **Task for students:** To discuss and present homework results. **Lecturer:** Brief presentation of the website. Connection of chemistry and the concept of "responsibility" in school context. **Task for students:** To search for an activity at the website and make connections with their thoughts on this subject. To develop an activity including the concept of responsibility, critical evaluation of other students' activities and to present it in front of the class.	Lecturing: **40%** Activities: **60%** Practice: /
Homework/Individual tasks To explore in detail the website www.living-democracy.com about activities involving "Responsibility".						

Session 2

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation Exploring chemistry curricula in primary and secondary schools, and the Primary and Secondary Education Act						
Session 2 **19.10.2020** **21.10.2020**	Introduction of the subject. Chemistry curricula in primary and secondary schools.	Knowledge and understanding of the Primary and Secondary Education Act and chemistry curricula in primary and secondary schools. Understanding the importance of science and science education in contemporary societies.	Rule of law and responsibility (Vol. III, part 2, unit 6, lesson 2) Understanding the EDC key concept "Valuing rule of law" in context of social behaviour and in chemistry teaching and learning.	C1 – D1, D4, D6 C3 – D13, D19 C7 – D39, D42	**Lecturer:** Introduction of the subject. Exploring the website mon.gov.mk. Discussion about the Primary and Secondary Education Act and analysis of its implementation in the teaching process. Introduces the Heinz dilemma and discusses with students if it is possible to break a particular law for a morally good reason in order to understand the difficult balance between legal duties and moral responsibilities. **Task for students:** Students imagine situations in which people (for good reasons) consider breaking the law or other rules and norms and illustrate their examples in the plenary discussion. **Lecturer:** Acquaints students with the chemistry (and related subjects) curricula in primary and secondary schools. Explores the website bro.gov.mk together with the students. **Task for students:** to examine chemistry textbooks in correlation with national chemistry programs and perceive differences in various textbooks. Plenary discussions.	Lecturing: **40%** Activities: **60%** Practice: /
Homework/Individual tasks /						

Session 3

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation Students think about their own expectations for this subject – what prerequisites and what kind of preparation future chemistry teachers need?						
Session 3 **26.10.2020** **28.10.2020**	Planning and organization of the teaching process	Specific characteristics of chemistry teaching. Planning in chemistry education.	/	C6 – D36 C14 – D82 C18 – D106	**Lecturer:** Specific characteristics of chemistry teaching (three levels of representation in chemistry, lab safety and precautions, etc.). **Task for students:** Discussion: What makes natural sciences different from other subjects – advantages and limitations of science teaching. **Lecturer:** Introducing global, thematic and operational/ daily planning – discussion through examples. Comparison of planning in natural sciences and in other subjects. **Task for students:** Development and adaptation of global, thematic and operational planning.	Lecturing: **40%** Activities: **30%** Practice: **30%**
Homework/Individual tasks		Developing global, thematic and operational planning.				

Session 4

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation e-materials – Reference Framework of competences Vol 2: pp. 15–23						
Session 4 **02.11.2020** **04.11.2020** **Depends on** **school schedule**	Types of teaching in chemistry education	Knowledge and understanding of different types of teaching	Competences for democratic culture – RFCDC. Introduction to the key descriptors. Creating posters (Vol. I, part 3, unit 2, tool 9)	C10 – D60 C11 – D65 C12 – D71	Lecturer: Explanation of the key descriptors in the CDC context . **Task for students:** Investigation and identification of competence descriptors for each of 4 cognate sets of the model ("the butterfly") which can be implemented with students in school context. **Lecturer**: Introduction of different types of teaching, specificity of chemistry teaching. **Task for students:** Determination and identification of teaching approach in relation to the specific chemistry content. **Task for students:** Students listen effectively and observe the way chemistry teacher leads and manages the class in the classroom.	Lecturing: **40%** Activities: **30%** Practice: **30%**
Homework/Individual tasks		Students should create a poster or cartoon inspired by one of the descriptors.				

Session 5

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation Observing different types of chemistry lessons in school and taking notes.						
Session 5 **09.11.2020** **11.11.2020** **Depends on school schedule**	Classification of lessons	Knowledge about different types of lessons	Charing plenary sessions (discussion and critical thinking) in EDC/HRE classes (Vol. I, part 3, unit 1, tool 3)	C6 – D33 C9 – D50 C12 – D70, D73 C16 – D94, D99 C18 – D109	**Lecturer:** Introduction and discussion of different types of lessons. **Task for students:** To choose one topic from chemistry textbook, identification of lessons according to the curricula and thematic planning, exchange working papers, and do peer group evaluation. **Task for students:** To observe and deliver different types of lessons at the university and in the school. Plenary sessions. Critical review of their own and other students teaching. Identification of at least one descriptor implemented with students in school context and explanation of their choice.	Lecturing: **20%** Activities: **20%** Practice: **60%**
Homework/ Individual tasks /						

Session 6

Session No/Date	Topic of the session	Chemistry Education with Didactics content	**Democracy content**	**CDC addressed**	**Session step by step (brief version)**	**Time allocation**
Student's preparation Observing different types of chemistry lessons in school and taking notes.						
Session 6 **16.11.2020** **18.11.2020** **Depends on school schedule**	Introduction to teaching methods	Knowledge and understanding of different teaching methods	Task-based learning (Vol. I, part 3, unit 1, tool 1) Charing plenary sessions (discussion and critical thinking) in EDC/HRE classes (Vol. I, part 3, unit 1, tool 3)	C7 – D41 C8 – D45 C10 – D62 C12 – D70, D73 C18 – D109	**Lecturer:** Classification and discussion of teaching methods in chemistry. Formation of concepts and representations in chemistry teaching. **Task for students:** To choose one topic from chemistry textbook, illustrate suitable teaching methods for given lessons within thematic planning, exchange working papers, and do peer group evaluation. **Lecturer:** Demonstration of experimental problem-based task as part of the task-based learning. **Task for students:** To observe and deliver different types of lessons at the university and in the school. Plenary sessions. Critical review of their own and other students teaching. Identification of at least one descriptor implemented with students in school context and explanation of their choice.	Lecturing: **20%** Activities: **20%** Practice: **60%** **Mock lesson** Demonstration of experimental problem-based task as part of the task-based learning – Determining the unknown substance (NaCl, Na_2CO_3 and Na_2SO_4).
Homework/Individual tasks Daily planning using problem-based approach						

Session 7

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation Living with Controversy – Teaching Controversial Issues Through Education for Democratic Citizenship and Human Rights (EDC/HRE), Activity 2.4: Other people's shoes. Think of a controversial issue and pose it in the form of a question, https://rm.coe.int/16806948b6						
Session 7 **23.11.2020** **25.11.2020** **Depends on** **school schedule**	Teaching methods in chemistry	Identification and implementation of specific teaching methods in chemistry	Teaching controversial issues Understanding other people points of view in teaching controversial issues.	C5 – D27 C6 – D36 C12 – D70, D73 C15 – D88 C17 – D103 C18 – 109	**Lecturer:** Discussion about different teaching methods and their applicability in chemistry teaching. Relation: traditional vs novel and innovative methods of teaching and learning. **Task for students:** To select a suitable topic from chemistry textbook, categorize lessons the lessons according to the curricula and thematic planning, and to propose appropriate teaching method for each lesson. Share and discuss ideas among other students. **Lecturer:** Teaching controversial issues in chemistry classes. **Task for students:** To observe and deliver different types of lessons at the university and in the school. Plenary sessions. Critical review of their own and other students teaching. Identification of at least one descriptor implemented with students in school context and explanation of their choice.	Lecturing: **30%** Activities: **10%** Practice: **60%** **Model class** prepared and implemented by the lecturer. Students as active participants. Teaching controversial issues – Are doctors allowed and should they perform experiments on humans when creating a new medicine?
Homework/Individual tasks Short essay – How to adapt discussion or debate with chemistry content? Illustrate one good-practice example in chemistry teaching.						

Session 8

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation /						
Session 8 **30.11.2020** **02.12.2020** **Depends on** **school schedule**	Graphical tools for organization and visualization in chemistry teaching	Knowledge and discussion about different types of graphical tools in chemistry teaching	Debating (Vol. IV, student manual 8.1, 8.2 and 8.3) Dilemmas (Vol. IV, student manual 2.1 and 2.2)	C5 – D27 C9 – D50, C12 – D70, D73 C15 – D88 C18 – D109	**Lecturer:** Strategies and techniques to stimulate creative approaches of delivering content using graphical tools. **Task for students:** To develop a lesson plan using graphical tools. **Lecturer:** Elaboration of the importance of discussion and debate in chemistry teaching. **Task for students:** To observe and deliver different types of lessons at the university and in the school. Plenary sessions. Critical review of their own and other students teaching. Identification of at least one descriptor implemented with students in school context and explanation of their choice.	Lecturing: **20%** Activities: **20%** Practice: **60%**
Homework/Individual tasks /						

Session 9

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation web-based search – selecting useful webpages and applications for chemistry; search the experiments at https://commons.wikimedia.org/wiki/Category:Chemistry_experiments_by_Shared_Knowledge						
Session 9 **07.12.2020** **09.12.2020** **Depends on school schedule**	Sources of scientific knowledge	The usage of various sources of scientific knowledge in chemistry teaching	Skills and strategies for media literacy (Vol. IV, Material for teachers, 9A)	C10 – D58, D62 C12 – D70, D73 C14 – D84 C18 – D109	**Lecturer:** Elaborates the need of various sources of scientific knowledge in chemistry teaching. **Task for students:** To present a webpage/ application/simulation for chemistry. **Lecturer:** Discussion: real vs virtual chemistry experiments. Explanation of the importance of media in contemporary communication. Introducing PhET interactive simulations in chemistry teaching. **Task for students:** To deliver different types of lessons at the university and in the school. Plenary sessions. Critical review of their own and other students teaching. Identification of at least one descriptor implemented with students in school context and explanation of their choice.	Lecturing: **30%** Activities: **20%** Practice: **50%**
Homework/Individual tasks Developing a lesson plan using ICT/PhET simulations.						

Session 10

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation		/				
Session 10 **14.12.2020** **16.12.2020** **Depends on** **school schedule**	Assessment in chemistry	Formative and summative assessment. Assessment methods	**/**	C7 – D41 C12 – D70, D73 C18 – D109	**Lecturer:** Knowledge about assessment and different types of assessment methods in chemistry teaching. **Task for students:** Plenary discussion – objectivity of assessment. **Lecturer:** Misconceptions in chemistry teaching – presenting results based on relevant research. **Task for students:** Discussions about their own experiences vs presented material. **Task for students:** To deliver different types of lessons at the university and in the school. Plenary sessions. Critical review of their own and other students teaching. Identification of at least one descriptor implemented with students in school context and explanation of their choice.	Lecturing: **40%** Activities: **30%** Practice: **30%**
Homework/Individual tasks Develop a knowledge test including elements students consider relevant.						

Session 11

Session No/Date	Topic of the session	Chemistry Education with Didactics content	Democracy content	CDC addressed	Session step by step (brief version)	Time allocation
Student's preparation National chemistry competition tests for primary and secondary school students.						
Session 11 **21.12.2020** **23.12.2020**	Development of knowledge tests	Development of knowledge tests (types of tests, types of questions, specification table)	/	C8 – D44 C10 – D61 C12 – D70, D73 C18 – D109	**Lecturer:** Discussion about tests as a type of assessment. Criteria for preparation and evaluation of tests. **Task for students:** Developing specification table and modifying their previously prepared tests. --- **Task for students:** To deliver lessons at the university involving ICT or PhET simulations. Plenary sessions. Critical review of their own and other students teaching. Identification of at least one descriptor implemented with students in school context and explanation of their choice.	Lecturing: **40%** Activities: **30%** Practice: **30%**
Homework/Individual tasks Analysis of one national chemistry competition test for primary or secondary school students.						

Session 12

Session **No/Date**	**Topic of the session**	**Chemistry Education with Didactics content**	**Democracy content**	**CDC addressed**	**Session step by step (brief version)**	**Time allocation**
Student's preparation Selection and analysis of national chemistry competition tests for primary and secondary school students.						
Session 12 **28.12.2020**	Bloom's taxonomy	Knowledge and implementation of Bloom's taxonomy	/	C10 – D61 C11 – D64, D68 C16 – D94, D98	**Lecturer:** Discussion about assessment based on Bloom's taxonomy. **Task for students:** Plenary discussions – Students present the results of the analysis of their and other people's tests, applying the gained knowledge. Improving developed knowledge test in accordance with the Bloom's taxonomy. **Lecturer:** End-of-the-semester fun – game-based learning.	Lecturing: **40%** Activities: **60%** Practice: **/** **Model lesson** Game-based learning as part of the formative assessment. Designing an escape room activity and implementation with students.
Homework/Individual tasks To create an educational game.						

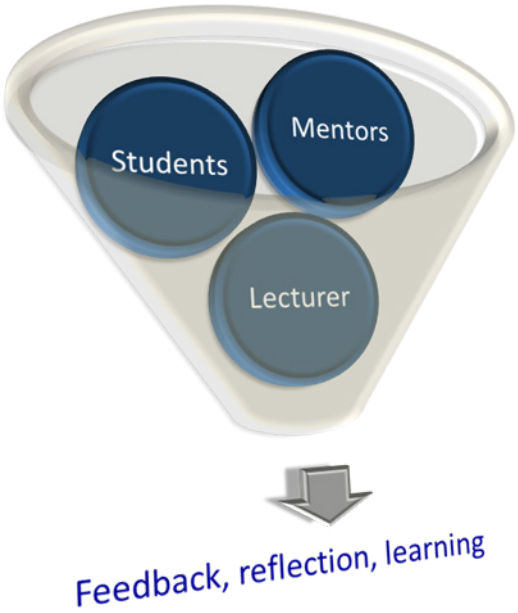
Detailed session plans

This section provides a detailed overview of all 12 session plans included in the module. In the planning itself, a distribution of the activities is made between the lecturer and the students, some of them dealing with a pre-service teachers' school practice. A part of the implemented activities was the same as every year, some were modified, and others were completely new. The idea was for most activities to produce discussion, critical and creative thinking, to develop moral values, empathy, life skills, and to enable students to respect each other and to work together as a group reinforcing learning by doing.

Furthermore, at the end of each session plan, a critical review of the implemented classes and activities is given. This self-reflection is very important segment of one's own teaching (and learning in the same time) enabling progress and improvement of the teaching practice. In principle, this course, in its original form, differs from other "purely chemical" courses in the way that it includes many pedagogical elements and student school practice. In other words, it makes use of pedagogical-content knowledge, essentially needed for future teachers' competences.

School practice is the most important part of a pre-service teachers' education, which brings together subject content expertise and pedagogical competencies and gives a completely different dimension to their future profession. Firstly, students (future teachers) listen effectively and observe the way chemistry teachers (the teacher mentors) lead and manage the class in the classroom, and summarize their impressions by writing notes and discuss later together with mentors and the lecturer. During these discussions, an honest and open communication between students, mentors and lecturer prevailed, and students were accepted as our future colleagues. Secondly, students planed the realization of given lesson and developed lesson plan, integrating the descriptors of competence. Students delivered lessons at the Faculty, and, after discussion and received suggestions, they adapted and improved lessons and delivered same ones in school.

The introduction of elements of democracy in the curriculum itself, to a large extent enriched the content, but also the quality of the implemented classes.



Session 1: The importance of teaching profession

Chemistry Content: The importance of teaching profession

Democracy Content: Responsibility (Introducing the website: www.living-democracy.com)

Competences for Democratic Culture: No. 7, 10, 20

Date: 12.10.2020 **14.10.2020**	**Time: 10:00–11:30** **10:00–11:30**	**Room: room 308 or online** **Room: room 308 or online**
Session No. 1		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	The importance of teaching profession		
Overview, issues addressed:	• Short introduction to the aims and objectives • The role of the teacher and teaching profession • EDC key concept "Responsibility"		
Aims and learning outcomes:	• Understand and discuss the importance of teaching profession • Make use of the website www.living-democracy.com • Understanding and applying the EDC key concept "Responsibility" in context of its implementation in chemistry teaching • Identify the range of responsibilities people have, understanding that responsibilities can come into conflict with each other, discuss the relation between chemistry and democracy.		
Practice teaching elements included:	/		
Percentage of time allocation:	**Lecture**	**Active learning by university students**	**Teaching practice in university or mock teaching**
	40%	**60 %**	**0%**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ☐ by student ☐ model class in schools ☐ by student ☐ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C)and descriptors (D) to be applied or trained:	**C7 Responsibility** D39 Shows that he/she accepts responsibility for his/her actions (B) D41 Submits required work on time (I) **C10 Autonomous learning skills** D62 Can select the most reliable sources of information or advice from the range available (A) **C20 Knowledge and critical understanding of the world (including politics, law, human rights, culture, cultures, religions, history, media, economies, the environment and sustainability)** D118 Can explain why everybody has a responsibility to respect the human rights of others (B)		
Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-11:30: room 308 – small-group classroom or online, day 1 10:00-11:30: room 308 – small-group classroom or online, day 2		
Materials needed	Notebooks		

Part II – Session step by step:

Lecture and group work/discussions: 12.10.2020, 10:00 – 11:30

Part 1: 10:00 – 10:45
Lecturer:
Lecturer introduces the idea that everyone has responsibilities of some kind and that problems can arise when people put some responsibilities above others.
Lecturer reads the story "Milan makes a choice" and discusses various issues with students.
Lecturer starts more general discussion about different kinds of responsibility and ask students about the responsibility they have:

- towards themselves
- in their home
- in their local/national community
- as students
- as future teachers

and ask them to think of some examples where people's responsibilities might conflict and how they can be resolved.

Part 2: 10:45 – 11:05
Task for students:
Students present their homework (short essay – What is your responsibility as future chemistry teacher?) in which they explain and justify the various responsibilities they would have in their future careers as teachers.
Students further elaborate and discuss issues related to teacher's responsibilities and propose solutions to imaginary dilemmas or problems they might face.

Part 3: 11:05 – 11:25
Lecturer:
Lecturer summarizes the discussion and makes connection between chemistry and the concept of "responsibility" in school context.
Lecturer gives brief presentation of the website.

Part 4: 11:25 – 11:30
Presenting homework:
Students should explore other activities on the website and make connections with their thoughts on this subject.

Lecture and group work/discussions: 14.10.2020, 10:00 – 11:30

Part 1: 10:00 – 10:15
Lecturer: Brief introduction – summarize the discussion from previous class.

Part 2: 10:15 – 10:35
Task for students: to develop an activity including the concept of responsibility based on the ideas they got from the website and to adapt it to a school setting. Students write this short activity on a piece of paper.

Part 3: 10:35 – 10:55
Task for students: Students critically evaluate other students' activities.
Each student gives his/her paper to the student to the right for a "review".
The "reviewer" builds upon the given activity, examine pros and cons of the activity and recommends suggestions for improvement.
The "author" decides which changes to accept and the text is finalized.

Part 4: 10:55 – 11:15
Task for students: Students, supported by the lecturer, present their activities in front of the class.

Part 3: 11:15 – 11:30
Debriefing and evaluation of the session:
We will have a possibility for students to give remarks and comments about the issues discussed in the lesson.

Part III – Report (Debriefing and evaluation):

General remarks from students:	- The discussion during this session brought us closer to our future profession and taught us about our responsibility. We, as every students' second family, have a huge responsibility in the educational process. - I think that such discussions should be included in schools to develop a sense of responsibility and development of deeper thinking in students, either throughout a class teacher discussion or within a particular subject. - The sessions were quite interesting and the time passed very quickly and imperceptibly. Through discussion, our thinking activity develops. By debating with each other, we learned a lot about responsibility, the activity, rights.
Debriefing of the Chemistry Content including homework	This was preparatory session and was not aimed at specific chemistry content but at the teaching profession in general. Students were given a before-class task to write a short essay titled "What is my responsibility as future chemistry teacher?" in which they expressed their thoughts and projections about their future career and their motivation on why they decided to become teachers. I will quote some of their statements: - It is the most noble profession in the world. Teachers and education are the foundation of a country. With his/her appearance in the school, every teacher should be an example above all to the pupils, as well as to their colleagues. - First, I decided to become a geography teacher, then I changed my mind to become a physicist, and finally I decided to be a chemistry teacher thanks to my primary school chemistry teacher. - Current developments in the pandemic have increased the responsibility of teachers. But are they rewarded for that? No matter what, the one who loves his/her profession will be rewarded eventually. The universe works 24/7. - The teaching profession is very responsible, everyone who chooses it should know that. Teachers are the creators of the future, of those who will move and govern the world. For these reasons, in addition to the fact that the teachers educate pupils in schools, at the same time they should direct them and point them out human and social values of human civilization. - A chemistry teacher must constantly learn and improve throughout his/her working life. For the pupils to get the necessary knowledge in chemistry, it takes great strength, creativity and ambition of the teacher. - When a good teacher-pupil relationship is established and trust is gained, then the pupil loves the subject. This motivates the pupil to learn and work, and achieves good results. The richer the pupil is in knowledge and skills, the better prepared he/she is for the future. - To be a teacher means to do the noblest work in the whole world. The teacher is a person who is literate, a person who leaves a deep mark in his/her pupils' lives. - (I will be) A teacher who during the teaching will apply new techniques and methods of work, and pupils will be free to give new suggestions for the organization of the class. A teacher who will have understanding towards pupils. A teacher who always helps. Communicative teacher. Teacher who will respect all pupils regardless of their religion, nationality, socio-economic status etc. A teacher who will motivate and encourage pupils. A professional teacher who keeps pupils attentive and disciplined. - When the teacher unites the love of work and students then he is the perfect teacher. - As for my responsibility as a chemistry teacher, I will do my best to give my students an idea of the concepts they will encounter in chemistry, to be able to solve chemistry problems, and I will do my best to help them develop a sense of responsibility in every area of their life.
Debriefing of the Democracy (EDC/HRE) content	EDC/HRE content implemented in this session was responsibility and it was addressed many times during discussions with students. From these discussions it emerged that the responsibility of each teacher is great and serious. Above all, he/she should take care of the successful realization of the lesson, to keep track of student achievement and assessment, to keep various records and administrative work, etc. But, in addition to this, the teacher should be available for the pupils, giving them some advice about a problem they have, and this is especially important if the teacher is also a class teacher. As a class teacher, it can happen that the class goes on an excursion for few days or have outdoor classes. The responsibility of the teacher is far greater here than when he/she is in the classroom. In this case, the teacher is the parent of maybe 30 pupils. In addition, just because we are talking about chemistry teachers, the responsibility is far greater than other teacher-colleagues, because the very nature of the subject requires the performance of various experiments, which may include acids and bases or other hazardous substances that require special caution. Flame and explosive experiments are also sometimes carried out. All this indicates that the role and responsibility of the chemistry teacher is of great importance and that it carries a great responsibility.

Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	**C7 Responsibility** D39 Shows that he/she accepts responsibility for his/her actions (B) Students discussed different types of responsibilities people have: towards their parents, other people, society etc. They also illustrated ways of cultural and ethical behaviour. One of the students elaborated his situation which was very similar to Milan's. In the student activity during the session 1, students imagine activities including the concept of responsibility in a school setting (other concepts were also addressed, e.g. empathy). Some of their ideas were: a pupil feels uncomfortable because he cannot go on an excursion due to financial difficulties in the family, ecology competition •the class that has the most collected caps, bottles or batteries will receive a reward, an older sister forgets to take her younger sister to school (based on the personal experience of one of the students, who emphasize the lesson learned from this event regarding responsibility), the dilemma that a pupil had when his friend broke a window – whether to escape as a sign of friendship or to report the incident. Students proposed solutions to these situations. (new – C13 D77 Expresses sympathy for the bad things that he/she has seen happen to other people) D41 Submits required work on time (I) All but one student submitted their homework on time. All students completed their activities on time during the session. **C10 Autonomous learning skills** D62 Can select the most reliable sources of information or advice from the range available (A) Students have successfully completed the task of searching the website www.living-democracy.com and developed an activity applicable in a school setting including the concept of responsibility based on the ideas they got from the website. **C20 Knowledge and critical understanding of the world (including politics, law, human rights, culture, cultures, religions, history, media, economies, the environment and sustainability)** D118 Can explain why everybody has a responsibility to respect the human rights of others(B) Students were given a google forms questionnaire in which they had to summarize their impressions from this session . This is a part of what they wrote: - Everyone has a moral duty not to interfere in the private life of the people around them. By recognizing and respecting the rights of people in the community, peace and freedom in the world are guaranteed. - Everyone should respect other people's human rights because that is a basic duty in society. In that way, a person shows respect and gratitude to others or to the community. The basic human right is the right to freedom and often this right is violated, consciously or unconsciously. Therefore, anyone who has denied this right to someone should bear responsibility and sanctions by the competent authorities. - According to the saying, "Do not do to others what you do not want them to do to you" and "Respect the other so that you may be respected.", we should not hurt anyone, because life will give you back like a boomerang. "Good returns with good", and "Bad returns with bad". - Because we as humans are all equal, we all have equal rights and we must not deprive others of their rights because we are not their creators. - By respecting human rights and freedoms, we contribute to a happy and fulfilling life. They apply to everyone regardless of origin or position in society. In this way, respect for human rights and freedoms is strengthened. There is a full development of human personality; full understanding, tolerance, gender equality and friendship in all nations. All people are given the opportunity to take an active part in society. By respecting the rights of others, we can expect others to respect us as well. Other descriptors were also addressed: C3 D12 Argues that schools should teach students about democracy and how to act as a democratic citizen (through students' comments in the debriefing) and C18 D106 Can describe his/her own motivations (through the essays about the importance and responsibilities of chemistry teachers).
General remarks by the lecturer:	I feel that students (and to a lesser extent the lecturer as well) were confused about the type of lesson and I assume that they expected more chemistry-related discussion. I base this opinion on the fact that students didn't want to read and discuss their essays although they were written beautifully and I told them so. Due to the COVID-19 pandemic, this (and all next) session was delivered online using Microsoft Teams.

Session 2: Introduction of the subject. Chemistry curricula in primary and secondary schools.

Chemistry Content: Introduction of the subject. Chemistry curricula in primary and secondary schools.

Democracy Content: Rule of law and responsibility

Competences for Democratic Culture: No. 1, 3, 7

Date: 19.10.2020 **21.10.2020**	**Time: 10:00–11:30** **10:00–11:30**	**Room: 308 or online** **Room: 308 or online**
Session No. 2		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Introduction of the subject. Chemistry curricula in primary and secondary schools.		
Overview, issues addressed:	• Primary and Secondary Education Act • Chemistry curricula in primary and secondary schools • EDC key concepts "Valuing rule of law" and "Responsibility"		
Aims and learning outcomes:	• Knowledge and understanding of the Primary and Secondary Education Act and chemistry curricula in primary and secondary schools • Explaining the importance of science and science education in the contemporary societies • Understanding and applying the EDC key concepts "Valuing rule of law" and "Responsibility" in context of social behaviour and in chemistry teaching and learning		
Practice teaching elements included:	/		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	40%	**60 %**	**0%**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ☐ by student ☐ model class in schools ☐ by student ☐ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C)and descriptors (D) to be applied or trained:	**C1 Valuing human dignity and human rights** D1 Argues that human rights should always be protected and respected (B) D4 Argues that all public institutions should respect, protect and implement human rights (I) D6 Expresses the view that all laws should be consistent with international human rights norms and standards (A) **C3 Valuing democracy, justice, fairness, equality and the rule of law** D13 Expresses the view that all citizens should be treated equally and impartially under the law (B) D19 Expresses the view that information on public policies and their implementation should be made available to the public (A) **C7 Responsibility** D39 Shows that he/she accepts responsibility for his/her actions (B) D42 Shows that he/she takes responsibility for own mistakes (I)		

Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-11:30: room 308 – small-group classroom or online, day 1 10:00-11:30: room 308 – small-group classroom or online, day 2
Materials needed	Notebooks

Part II – Session step by step:

Lecture and group work/discussions: 19.10.2020, 10:00 – 11:30

Part 1: 10:00 – 10:30

Lecturer:

Lecturer gives introduction of the subject.

Lecturer explores the website mon.gov.mk together with the students.

Lecturer acquaints students with the laws related to the educational process.

Part 2: 10:30 – 10:45

Task for students:

Students should list at least three things they think that must be included in the Primary and Secondary Education Act and justify their choice.

Part 3: 10:45 – 10:55

Lecturer:

Lecturer initiates a discussion whether teachers and pupils should obey the law (and other rules and norms) and why.

Lecturer introduces the Heinz dilemma.

Part 4: 10:55 – 11:05

Task for students:

Students analyse this moral dilemma in a plenary discussion and critically evaluate reasons for legal obedience.

Part 5: 11:05 – 11:15

Lecturer:

Lecturer asks the students to think of as many reasons as they can as to why it is wrong to break the law (reasons including self-interest, concern for other people and concern for the well-being of society as a whole).

Lecturer discusses with students if it is possible to break a particular law for a morally good reason in order to understand the difficult balance between legal duties and moral responsibilities.

Lecturer asks students if they have experience with breaking the rules and for what reasons (using google forms for anonymity).

Part 6: 11:15 – 11:25

Task for students:

Students imagine situations (write a short story related to some issue of the educational process) in which people (for good reasons) consider breaking the law or other rules and norms (some ideas: breaking the speed limit or passing a red light at a traffic light to arrive on time for the exam on which his/her future career depends on, student cheats on exam/falsifies grade to avoid passing into co-financing quota due to financial problems in the family) and prioritize one solution to the situation giving proper reasoning.

Students illustrate their examples in the plenary discussion. The teacher then underlines the distinction between moral responsibilities (which people take upon themselves as part of their own values and beliefs) and legal duties, which are imposed by governments.

Part 7: 11:25 – 11:30

Debriefing and evaluation of the session:

We will have a possibility for students to give remarks and comments about the issues discussed in the lesson.

Lecture and group work/discussions: 21.10.2020, 10:00 – 11:30

Part 1: 10:00 – 10:30
Lecturer:
Lecturer acquaints students with the chemistry (and related subjects) curricula in primary and secondary schools. Lecturer explores the website bro.gov.mk together with the students.

Part 2: 10:30 – 11:15
Task for students:
Working in pairs, to examine chemistry textbooks in correlation with national chemistry programs, to perceive differences in various textbooks.
Plenary discussions and making connections between legal obligations and responsibilities of chemistry teachers, and their needs and requirements in school settings.

Part 3: 11:15 – 11:30
Debriefing and evaluation of the session:
We will have a possibility for students to give remarks and comments about the issues discussed in the lesson.

Part III – Report (Debriefing and evaluation):

General remarks from students:	- We found this session very interesting and engaging. - We were carried away by the discussion and we did not feel when the time passed. - The dilemma we discussed in this session was related to chemistry and a situation of everyday life; it was about different opinions of a chemist and an "ordinary" citizen. This prompted us to think about how we would behave in different situations.
Debriefing of the Chemistry Content including homework	Students were introduced to the laws related to the educational process (Primary and Secondary Education Act and the Teachers and Professional Associates in Primary and Secondary Schools Act) and the website mon.gov.mk where they can receive relevant information. Students were interested in the obligations teachers have during the year and other issues related to their future job. Furthermore, students were acquainted with the chemistry (and related subjects) curricula in primary and secondary schools by exploring the website bro.gov.mk. They made connections between legal obligations and responsibilities of chemistry teachers, and their needs and requirements in school settings. Some thoughts of the students were: - The teacher has an obligation to create a stimulating atmosphere in the classroom with effective methods to attract students' attention and encourage their creativity. But for all this to be implemented, the teacher needs funds and working conditions. The teacher can best transfer material through experimental work, so a laboratory and chemical reagents are needed. For successful work and advancement, the continuous professional development of chemistry teacher through seminars and different trainings is very important. - The legal obligations and responsibilities of teachers are closely correlated. Almost all the responsibilities of teachers are determined by law and most laws are adopted based on the responsibilities of teachers. So if one thing is done, the other is done automatically, in a way like redox processes. But in order to have harmony between these two tasks of teachers (in chemistry), their needs and requirements should be taken into account. The demands and needs for teaching chemistry are great, especially for the practical part. Therefore, educational institutions should take into account the needs and requirements of chemistry teachers.
Debriefing of the Democracy (EDC/HRE) content	EDC/HRE content implemented in this session was rule of law and responsibility and it was addressed in all activities during the first day of the session, as well as in the students' activity in the second day. Students argued that rules should be followed and laws must be obeyed, but also giving personal testimonies of (non)observance of the rules. This was done through an anonymous survey using google forms, and students had to fill it out during the lesson. Thus, two students stated that they had not worn a mask (in one case when getting off the bus, and in the other in the park), but the outcome was different, although it is a similar situation – in the first case they passed with a warning, and in the second case they paid a fine. Another student stated that while waiting for her sister from school, she spent the money she had collected as a class treasurer to buy something to eat. But then she had a guilty conscience and spent a whole week collecting money to pay it back. Another student shared his experience when he turned on a fire extinguisher in the school corridor out of curiosity and was fined and sent to a disciplinary commission. Other examples included crossing the street at red light and late semester enrolment.

Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	During discussion about the rule of law in general, and particularly focusing on the local laws and rules regarding teachers, several competences were addressed: **- C1 Valuing human dignity and human rights** - D1 Argues that human rights should always be protected and respected (B) - D4 Argues that all public institutions should respect, protect and implement human rights (I) **- C3 Valuing democracy, justice, fairness, equality and the rule of law** - D13 Expresses the view that all citizens should be treated equally and impartially under the law (B) - D19 Expresses the view that information on public policies and their implementation should be made available to the public (A) Students elaborated their claims that laws must be obeyed, otherwise there will be confusion, chaos and disorder. According to their statements, we should all be aware of the consequences of disobeying laws and rules, such as fines and even imprisonment. Some students, hesitantly, said that sometimes the law should be broken, as in the case of Heinz. They also referred to several rules related to the educational process – school code, protecting the school equipment, respecting the teachers, disciplinary procedures for students, and expressed their believes and experiences as pupils and students. During the discussions on the first day (part 1-3), new competences aroused: C1 D3 Defends the view that no one shall be subjected to torture or to inhuman or degrading treatment or punishment (I) C3 D14 Argues that laws should always be fairly applied and enforced (B) Namely, there are situations in which a pupil verbally insults another pupil or teacher or behaves inappropriately. Therefore, he/she should be punished because the rules should apply to everyone. Unfortunately, the last measure that is applied in our schools is the transfer of the pupil to another school, which does not solve the problem; it is very likely that he/she will continue his/her behaviour there. D6 Expresses the view that all laws should be consistent with international human rights, norms and standards (A) This was not addressed in the session. **C7 Responsibility** D39 Shows that he/she accepts responsibility for his/her actions (B) D42 Shows that he/she takes responsibility for own mistakes (I) These were addressed through students' personal testimonies (these are explained in the previous section), but I also found (day 1 part 5 and 6 – see the discussion in general remarks by the lecturer) several other competences and descriptors that emerged from the discussions: C11 D65 Uses evidence to support his/her opinions. C12 D70 Listens carefully to differing opinions. C18 D108 Can reflect critically on his/her own values and beliefs. C18 D109 Can reflect critically on himself/herself from a number of different perspectives.

General remarks by the lecturer:	This was a wonderful session; both the lecturer and the students were pleasantly surprised by the ease with which the discussion took place and the whole realization of the session. However, it took me twice as much time as I had planned. Thus, changes in the timeline should be made. Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. Students showed a great creativity in imagining situations in which people (for good reasons) consider breaking the law or other rules and norms. I started by giving an example: "I'm a pupil from Kruševo, and my father is taking me to a chemistry competition in Skopje. There was a car accident and traffic jam, the street was blocked for an hour. Due to this, we could be late for the competition which starts on time. I was nervous because this was very important in my life and my enrolment in high school depended on this. I trained hard and maybe I could win, and get a reward. So, I asked my father to drive faster. When we arrived in Skopje, a red light comes on at the traffic light. There are no cars around us. Should my father pass a red light at a traffic light or not?" The idea was to leave an open end, so we can discuss the possible solutions. Based on this example, students wrote short stories. In brief, these stories covered: - A teacher with a headache comes to work and gives free activities to the pupils, when the inspection comes to class. Did the teacher do the right thing by coming to work today and holding a class like this? - Sarah has to pass two more first year subjects in this session so as not to transfer to a private quota. She lives in another city and her parents are not financially strong. Sarah plans to cheat to pass the course. Is her decision correct? - The I-3 pupils agreed to skip class. However, several pupils disagreed with this. Should these pupils skip class on behalf of friendship or stay in class out of respect for the teacher and the school? - Pupils must wear school uniforms. Anna came to school in ripped jeans and a T-shirt. The class teacher sanctioned Anna, telling her to go home and change her clothes and come back to school. Anna lived on the other side of town and needed more time to get home and return. Did the class teacher act correctly? - I am a student, I was in a hurry for my practical at the faculty because I was helping an old lady to cross the street. Will the assistant let me enter the lab? (after the discussion, this story was modified – I am a student, I was in a hurry for my practical at the faculty when I saw an old lady trying to cross the street. Should I help her or rush to faculty?) - Student is in a hurry for the exam, last chance to take it. He sees a kitten stuck in a manhole. Should the student help it or go to the exam? (This is similar to previous one, but the discussion was about whether we should treat humans and animals the same in similar situations.)

Session 3: Planning and organization of the teaching process

Chemistry Content: Planning and organization of the teaching process

Democracy Content: /

Competences for Democratic Culture: No. 6, 14, 18

Date: 26.10.2020 **28.10.2020**	**Time: 10:00–12:00** **10:00–12:00**	**Room: 308 or online** **Room: 308 or online**
Session No. 3		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Planning and organization of the teaching process		
Overview, issues addressed:	• Specific characteristics of chemistry teaching • Global, thematic and operational/daily planning in chemistry education		
Aims and learning outcomes:	• Explaining the specific characteristics of chemistry teaching • Knowledge and understanding of the global, thematic and operational/daily planning in chemistry education • Developing different types of planning		
Practice teaching elements included:	Preparing global, thematic and operational/daily planning		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	40 %	**30 %**	**30 %**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ■ by student ☐ model class in schools ☐ by student ☐ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C) and descriptors (D) to be applied or trained:	**C6 Civic-mindedness** D36 Discusses what can be done to help make the community a better place (I) **C14 Flexibility and adaptability** D82 Modifies his/her opinions if he/she is shown through rational argument that this is required (B) **C18 Knowledge and critical understanding of the self** D106 Can describe his/her own motivations (B)		
Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-12:00: room 308 – small-group classroom or online, day 1 10:00-12:00: room 308 – small-group classroom or online, day 2		
Materials needed	• Notebooks • National curricula and chemistry textbooks • Molecular models • Apparatus for a simple experiment		

Part II – Session step by step:

Lecture and group work/discussions: 26.10.2020, 10:00 – 12:00

Part 1: 10:00 – 10:45
Lecturer:
Lecturer discusses specific characteristics of chemistry teaching (e.g. three levels of representation in chemistry, lab safety and precautions, etc.).

Part 2: 10:45 – 11:10
Task for students:
Students contrast what makes natural sciences different from other subjects and distinguish advantages and limitations of science teaching.
Students illustrate good and bad examples they encountered in their education and elaborate on why certain teacher left a good or bad impression on them.
Students outline their own expectations for this subject and predict what prerequisites and what kind of preparation future chemistry teachers need. Plenary discussion.

Part 3: 11:10 – 11:55
Lecturer:
Lecturer introduces global, thematic and operational/daily planning – discussion through examples. Lecturer compares the planning in natural sciences and in other subjects.

Part 4: 11:55 – 12:00
Homework assignment:
Students should select a topic/unit to develop the global, thematic and operational planning.

Lecture and group work/discussions: 28.10.2020, 10:00 – 12:00

Part 1: 10:00 – 10:15
Lecturer:
Brief introduction – summarize the discussion from previous class.

Part 2: 10:15 – 10:45
Task for students:
Students present their global planning.
Students critically evaluate other students' global planning and adapt their own planning according to the suggestions by the lecturer and other students.

Part 3: 10:45 – 11:15
Task for students:
Students present their thematic planning.
Students critically evaluate other students' thematic planning and adapt their own planning according to the suggestions by the lecturer and other students.

Part 4: 11:15 – 11:45
Task for students:
Students present their operational/daily planning.
Students critically evaluate other students' operational planning and adapt their own planning according to the suggestions by the lecturer and other students.

Part 5: 11:45 – 11:50
Homework assignment:
Students should analyse the remarks on their global, thematic and operational planning and improve it in a written report.

Part 9: 11:50 – 12:00
Debriefing and evaluation of the session:
We will have a possibility for students to give remarks and comments about the global, thematic and operational planning in chemistry teaching.

Part III – Report (Debriefing and evaluation):

General remarks from students:	The students were satisfied with the way this session was conducted and the way the theory and practice were intertwined, as well as with the discussion and expression of their own opinions and views and the opportunity to ask questions to the mentor teachers.
Debriefing of the Chemistry Content including homework	The aim of this session was to: - Explain and discuss about the specific characteristics of chemistry teaching (e.g., three levels of understanding in chemistry – macroscopic, microscopic and symbolic; performing experiments; safety issues etc.). Students were shown a video of a chemical reaction (experiment – macroscopic level) and were supposed to represent this reaction on microscopic and symbolic level. Their drawings were presented in front of all of us and discussed. After that, they made improvements according to the suggestions. Also, several webpages and useful links were provided to students. - Introduce and develop the global, thematic and operational/daily planning in chemistry education. The lecturer gave a theoretical background on the types of planning in our teaching process, the mentors showed several examples of their planning sharing some tips and tricks, and students presented their planning, critically evaluated other students' planning and adapted their own planning according to the suggestions by the lecturer, mentors and other students. Also, students contrasted what makes natural sciences different from other subjects and distinguished advantages and limitations of science teaching (e.g., it is more engaging to involve an experiment, but it seeks a great caution, responsibility and additional time).
Debriefing of the Democracy (EDC/HRE) content	/
Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	**C6 Civic-mindedness** D36 Discusses what can be done to help make the community a better place (I) This session began with a discussion of how a chemistry teacher can contribute to the improvement of society as a whole. The examples given in the discussion included creating of active citizens through: •environmental activities (afforestation, school yard landscaping they will gladly remember and, which will encourage students to protect the environment. •education on air, water and soil pollution (ecological fuels, harmful raw materials, making models of windmills, visiting factories, etc.) •connecting chemistry with problems of everyday life so that students will understand the importance of studying chemistry •connecting chemistry teaching with everyday life situations or terms – e.g. which sugars are good; where did you come across the terms kilo, mega, giga; what is a hybrid, etc. **C14 Flexibility and adaptability** D82 Modifies his/her opinions if he/she is shown through rational argument that this is required (B) The mentor teachers shared their school preparations and together with the lecturer commented on the preparations prepared by the students. Based on these suggestions, the students made a modification of their preparations.

	C18 Knowledge and critical understanding of the self D106 Can describe his/her own motivations (B) Students based their motivation to become chemistry teachers on their experiences as pupils, discussing the good (conducting experiments, teacher paying attention to each pupil whether he/she has difficulties or is talented, participating in competitions, good communication in the class) and the bad examples (teaching a lesson through dictation and without communication with pupils, pupils tremble with fear of the teacher, teacher insults pupils). Here are some of their discussions: - I consider a lesson in which there is harmony between the teacher and the pupils to be a good lesson. The lesson in which the pupil will be curious and creative. The lesson in which the pupil will be praised for his/her courage even though there may not be a perfect answer. The lesson that can be implemented outside the classroom. The lesson that will make pupils compete. Pupils should learn for knowledge, not for grades. - Now I will say a few sentences about the teacher who left the biggest impression on me in my education. Because of her, I love chemistry because she performed experiments almost every time we had a lesson. She was always smiling, positive and ready to help us. I only worked with her for a year, and then even better one came. I participated with this teacher in two competitions where I achieved a solid result thanks to the knowledge that she passed on to me.
General remarks by the lecturer:	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. Molecular models and apparatus for simple experiment were replaced with online pictures, simulations and videos. When preparing in detail for this session I implemented that it is better to start with discussion with students (No. 1 from part 2, day 1 and similar issues), then to talk about specific characteristics of chemistry teaching, and continue with students' discussions. In this session, even though it wasn't planned, mock teaching by classroom teachers (mentors) was included as practice teaching format, beside model lesson by students. School chemistry teachers, one from primary and one from secondary school, participated in the session by providing different type of planning to students based on their experience in school. The mentor teachers shared their experiences and gave advice to the students – respect your students and they will respect you. This was an invaluable experience for all parties •students, lecturer and teachers. We discussed and exchanged ideas from different fields, as if we had been friends for years, and not as if this was the first contact between teachers and students. In addition, it took a little longer than planned for the realization of the activities, but also for the involvement of the mentor teachers in the class. This means, if mentor teachers are active participants in the class, one extra hour should be provided.

Session 4: Types of teaching in chemistry education

Chemistry Content: Types of teaching in chemistry education

Democracy Content: Competences for democratic culture – RFCDC. Introduction to the key descriptors.

Competences for Democratic Culture: No. 10, 11, 12

Date: 02.11.2020 **04.11.2020** **Depends on school schedule**	**Time: 10:00–12:00** **10:00–12:00** **Depends on school schedule** **(2 school classes x 2 days)**	**Room: 308 or online** **Room: 308 or online** **Primary/secondary school**
Session No. 4		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Types of teaching in chemistry education		
Overview, issues addressed:	• Different types of teaching • Introduction to the key descraiptors		
Aims and learning outcomes:	• Knowledge and understanding of different types of teaching • Identification of competence descriptors for each of 4 cognate sets of the model ("the butterfly") which can be implemented with students in school context		
Practice teaching elements included:	Observing lessons in the primary/secondary school to compare different types of teaching		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	40 %	**30 %**	**30 %**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ☐ by student ☐ model class in schools ☐ by student ■ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C) and descriptors (D) to be applied or trained:	**C10. Autonomous learning skills** D60. Can learn about new topics with minimal supervision (I) **C11. Analytical and critical thinking skills** D65. Uses evidence to support his/her opinions (B) **C12. Skills of listening and observing** D71. Listens attentively to other people (B)		
Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-12:00: room 308 – small-group classroom or online, day 1 10:00-12:00: room 308 – small-group classroom or online, day 2 2 school classes x 2 days in primary/secondary school		

Materials needed	- Notebooks - National curricula and chemistry textbooks Descriptors of competences (https://www.coe.int/en/web/reference-framework-of-competences-for-democratic-culture/descriptors-of-competences#Key)

Part II – Session step by step:

Lecture and group work/discussions: 02.11.2020, 10:00 – 12:00

Part 1: 10:00 – 10:30
Lecturer:
Explanation of the key descriptors in the context CDC (using the website https://www.coe.int/en/web/reference-framework-of-competences-for-democratic-culture/descriptors-of-competences#Key)

Part 2: 10:30 – 11:00
Task for students:
Students further investigate the key descriptors and identify at least one competence descriptor for each of 4 cognate sets of the model ("the butterfly") which can be implemented with students in school context and explain own selection for each descriptor (within their thematic planning from the previous lesson activity).

Part 3: 11:00 – 11:30
Task for students:
Students sit in a circle, in groups of 4-5. Each student writes the title of the topic and the selected descriptors on a piece of paper. The sheet is then passed to the student on the right, who chooses another descriptor appropriate for the given topic. This procedure continues until the sheet is returned to the student who sent the sheet at the beginning.

Part 4: 11:30 – 11:55
Task for students:
Each student creates a learning activity in which (s)he tries to compile all the competence descriptors (own and recommended by other students).

Part 5: 11:55 – 12:00
Homework assignment:
Students improve their activities and prepare for presentation.

Lecture and group work/discussions: 04.11.2020, 10:00 – 12:00

Part 1: 10:00 – 10:15
Lecturer:
Brief introduction – summarize the discussion from previous class.

Part 2: 10:15 – 10:45
Task for students:
Students present their learning activities in which several descriptors are included, and at the end they justify the suitability of the descriptors.

Part 3: 10:45 – 11:30
Lecturer:
Discusses the different types of teaching (frontal, group, tandem, individual), emphasizing the specificity of chemistry teaching.

Part 4: 11:30 – 11:55
Task for students:
Students analyse one topic from chemistry textbook (according to the thematic planning) in terms of different ways of delivering content to students to categorize the lessons according to different types of teaching and justify their choice.

Part 5: 11:55 – 12:00
Homework assignment:
Students should create a poster or cartoon inspired by one of the descriptors.

School practice and group work/discussions: time depends on school schedule

Part 1: Time and date depend on school schedule (2 school classes x 2 days – observation in school)
Task for students:
Students listen effectively and observe the way chemistry teacher leads and manages the class in the classroom. Students summarize their impressions by writing notes.

Part III – Report (Debriefing and evaluation):

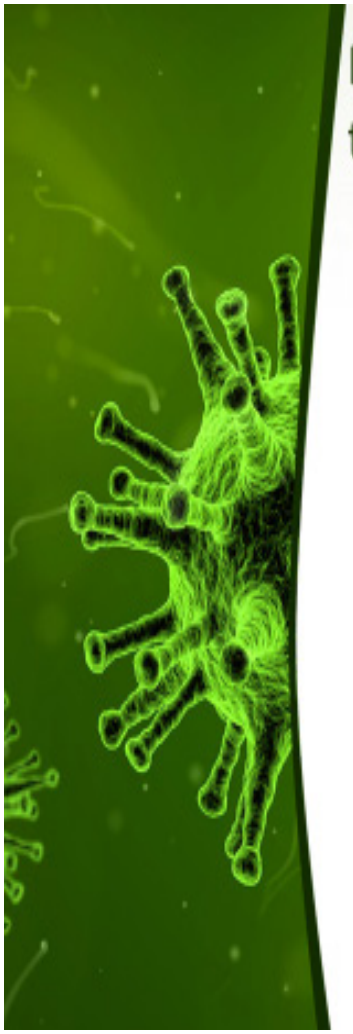
General remarks from students:	Students found this session very engaging. The most positive comments were those about attending online classes with pupils, which were led by the subject teachers. Some of the students' comments regarding the school lessons were: - In general, with both elementary and high school pupils, there was a relaxed atmosphere in the classes, the communication with the pupils was at a high level, and the relationship with the pupils was positive and pleasant. The activities were adjusted to the age of the pupils. - The pupils were active during the class; the teachers tried to ask questions to all of the pupils, not just those who raised their hands. The teachers praised each good answer which motivated the pupils. - The time was well planned. - In the class with the high school students, the teacher solved chemical stoichiometry problems. I thought it was not possible to do stoichiometry online, but I was convinced otherwise. - I liked that the teacher found time for a student who needed extra help. - I am impressed by the way the teacher had prepared the quiz for the pupils and the way it was implemented.
Debriefing of the Chemistry Content including homework	Students deepened their knowledge about different types of teaching by analysing one topic from chemistry textbook (according to the thematic planning) and categorizing the lessons according to different types of teaching and by justifying their choice. The task was to make connection with the content from the previous session i.e., to integrate the knowledge about different types of teaching into the planning in chemistry education. Each student elaborated his/her work.
Debriefing of the Democracy (EDC/HRE) content	The students had the task for one topic (best for the one that they had already had thematic planning) to choose one descriptor from each category: values, attitudes, skills and knowledge and critical understanding, which they consider applicable to pupils in the realization of the lessons from chosen topic and to send me an email with a topic title and 4 descriptors written one below the other. Then, the students worked in groups of three and each student had to add one descriptor that he/she considered appropriate to those of the colleague. There was a slight misunderstanding about the given task: some students either wrote 4 descriptors from each category (total 16) or chose 4 descriptors from one competence. Therefore, additional explanation was provided by the lecturer and an example of her evaluation using descriptors. However, this is a novelty for them and it takes time to adopt. This can be seen from their discussions the next lesson, where they implemented that some of the descriptors they had chosen, were inappropriate. However, I believe that by applying descriptors further and incorporating them into specific teaching units, but also by devoting sufficient time to making the choice, students will become much more successful in this. Moreover, the classes were conducted online and the lecturer had no insight into what the students were writing. If the classes were held at the university, of course the lecturer would look in the students' notebooks, so she would react in time, and thus no unnecessary time of the session would be lost. Students were very creative in designing their posters or cartoons inspired by one of the descriptors (this was given as a homework). Descriptors that served as inspiration for students were: D24 Expresses an appreciation of the opportunity to have experiences of other cultures, D36 Discusses what can be done to help make the community a better place, D41 Submits required work on time, D71 Listens attentively to other people, D78 Tries to understand his/her friends better by imagining how things look from their perspective, and D100 Can communicate with conflicting parties in a respectful manner.

Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	All competences, represented with suitable descriptors (C10 D60, C11 D65 and C12 D71), were addressed during the students' activity (day 1, part 2-5 and day 2, part 2). The use of descriptors is something new for students and they have successfully applied this concept, especially after completing homework, when they had enough time to get acquainted with descriptors and understand their application, and thus be able to explain it. Furthermore, D71 representing the skill of listening and observing was very important during school lesson observations. Students observed two lessons in primary and two lessons in secondary school and discussed it afterwards with the mentors and the lecturer. The two classes that students attended in primary school were the same. Also, both classes in high school were the same. In this way, students can make a comparison in the way the material is presented •the same lesson and the same online conditions, but different students, different class dynamics, different approach, different questions from both the teacher and the students, etc.
General remarks by the lecturer:	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. Students were very cooperative and I'm very pleased with what they have achieved and amazed by their creativity expressed through drawings and posters. After students' observations in class, the mentors were interested in hearing the opinion of the students and the lecturer regarding their classes. Thus, this part of the session was done immediately after the school classes, and was only summarized afterwards at the end of the lecture (day 2). The lecturer preferred the students to express their opinion first, so as not to impose herself as an authority and to lead the students to her opinion. In this part there was honest and open communication between students, mentors and lecturer and students were accepted as our future colleagues.

Students' posters and cartoons inspired by one of the descriptors are given below.

D78 Tries to understand his/her friends better by imagining how things look from their perspective

D41 Submits required work on time



D24 Expresses an appreciation of the opportunity to have experiences of other cultures

D71 Listens attentively to other people

D100 Can communicate with conflicting parties in a respectful manner

Session 5: Classification of lessons

Chemistry Content: Classification of lessons

Democracy Content: Charing plenary sessions (discussion and critical thinking)

Competences for Democratic Culture: No. 6, 9, 12, 16, 18

Date: 09.11.2020 **11.11.2020** **Depends on school schedule**	**Time: 10:00–12:00** **10:00–12:15** **Depends on school schedule** (2 school classes of observation, 3 school classes of practical work and 45 min. of plenary sessions)	**Room: 308 or online** **Room: 308 or online Primary/ secondary school**
Session No. 5		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Classification of lessons		
Overview, issues addressed:	- Introduction and discussion of different types of lessons - Charing plenary sessions (discussion and critical thinking) - Observing and delivering different types of lessons at the university and in the school		
Aims and learning outcomes:	- Knowledge and understanding of different types of lessons - Supporting discussion and critical thinking - Critical review and evaluation of their own and other students' teaching		
Practice teaching elements included:	Observing and delivering different types of lessons at the university and in the primary/secondary school		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	20%	**20 %**	**60%**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ■ by student ☐ model class in schools ■ by student ■ classroom teacher ☐ lecturer ☐ other format (specify):		

RFCDC: Competences (C)and descriptors (D) to be applied or trained:	**C6. Civic-mindedness** D33. Expresses a willingness to co-operate and work with others (B) **C9. Tolerance of ambiguity** D50. Engages well with other people who have a variety of different points of view (B) **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C16. Co-operation skills** D94. Builds positive relationships with other people in a group (B) D99. When working with others, supports other people despite differences in points of view (A) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I)
Room preparation, infrastructure (board, beamer, flipchart etc.):	- LCD Projector - Computer - Whiteboard - Whiteboard markers **Room settings:** 10:00-12:00: room 308 – small-group classroom or online, day 1 10:00-12:15: room 308 – small-group classroom or online, day 2 (3 school classes of practical work (teaching) at the university) 2 school classes of observation in primary/secondary school 3 school classes of practical work (teaching) in primary/secondary school and 45 minutes plenary sessions
Materials needed	- Notebooks - National curricula and chemistry textbooks - Other, depending on the lesson type (e.g., laboratory equipment and chemicals, molecular models, posters, …)

Part II – Session step by step:

School practice and group work/discussions: time depends on school schedule

Part 1: Time and date depend on school schedule (2 classes – observation in school)
Task for students:
Students listen effectively and observe the way chemistry teacher leads and manages the class in the classroom (different types of classes should be covered). Students summarize their impressions by writing notes.

Lecture and group work/discussions: 09.11.2020, 10:00 – 12:00

Part 1: 10:00 – 10:45
Lecturer:
Discusses different types of lessons (introductory, new lesson, laboratory work, review, generalization and systematization, assessment, recreational, combined, …) – discussion through examples.

Part 2: 10:45 – 11:15
Task for students:
Students, based on their previous work on thematic planning, identify the type of lessons within given topic from chemistry curricula.
Students exchange working papers and perform peer group evaluation.

Part 3: 11:15 – 11:35
Task for students:
Plenary sessions: Students express and summarize their impressions from school class observation and compare them with each other to discover the type of lesson and to evaluate the way the teacher teaches, emphasizing the things that left the strongest impression on them, as well as the things that they did not like.

Part 4: 11:35 – 11:45
Lecturer:
Lecturer encourages every student to participate and share his/her opinion and makes sure that students share their criteria for judgment and reflect the reasons for their choice of criteria (competence of judgment or interactive constructivist learning).

Part 5: 11:45– 11:50
Homework assignment:
Students should plan the realization of given lesson and develop lesson plan, integrating the descriptors of competence.
(approximately 1.5-hour individual student's preparation)

Part 6: 11:50 – 12:00
Debriefing and evaluation of the session:
We will have a possibility for students to give remarks and comments about the issues discussed in the lesson.

School practice and group work/discussions: 11.11.2020, 10:00 – 12:15

Part 1: 10:00-11:30

Task for students:
Students deliver lessons at the university (individually) according to the previously developed joint lesson plan.

Part 2: 11:30-12:15
Lecturer:
Lecturer, together with other students, gives feedback regarding the realization of the lesson by the student.

School practice and group work/discussions: Time and date depend on school schedule (3 classes practical work in school and 45 minutes plenary sessions)

Part 1:
Task for students: (3 classes practical work in school)
Students adapt and improve the lessons delivered at faculty and deliver the same lessons in the school.

Part 2:
Task for students: 30 min.
Plenary session: Students have to critically review and reflect their own and other students teaching and recommend ways for improvement. Each student has to identify at least one descriptor for his/her lesson implemented with pupils in school context and explain his/her choice.

Part 3:
Debriefing and evaluation of the session: 15 min.
We will have a short possibility for students to give remarks and comments about their performance in the classroom. Students summarize comments from the lecturer and other students and reflect their own performance by writing notes.

Part III – Report (Debriefing and evaluation):

General remarks from students:	Students gave opinions about the teacher's lectures in front of the pupils, as well as about the their colleagues' lectures. They observed two classes in the first-year high school, and the topic was chemical symbols and formulae. Students gave usual remarks about the time management, the teacher's attitude towards the students, as well as their mutual communication. The students noted that the teacher also asked the pupils who did not raise their hands, asked them questions, indicated to the pupils when they knew and what to pay attention to in the future, and encouraged them to be more active. Student also noticed that a lot of time in the class was spent dictating the elements pupils needed to memorize, rather than just telling them the atomic numbers they could find in the Periodic Table. It was interesting that the teacher gave examples that attract the students' attention and make it easier for them to remember some things from the material, e.g., Auuuuu, how much gold she has on herself (chemical symbol for gold is Au) or H_2O is the chemical "word" for water and it is the same all over the world, but if we go to Macedonia, we'll ask for вода (voda), in England for water, in Germany for wasser, in Albania for ujë and so on.
Debriefing of the Chemistry Content including homework	Students deepened their knowledge about different types of lessons by analysing one topic from chemistry textbook (according to the thematic planning) and categorizing the lessons according to type, and justifying their choice. The task was to connect the content from three sessions: planning in chemistry education, types of teaching and types of lessons. Some students did not follow the time distribution according to the curriculum, so additional interventions from lecturer were needed. Therefore, the whole-class discussion showed to be better way to perform this task instead of exchanging working papers between students (author-reviewer role play) and each student elaborated his/her work.
Debriefing of the Democracy (EDC/HRE) content	This was the first session in this module in which students delivered lectures both at the university and in school. As it was for the first time that students appeared in front of pupils and taught, the lecturer gave the same lesson to three students. They had to make a lesson plan together, but each taught individually. Still, the most important were the plenary sessions afterwards, where students, mentors and the lecturer could discuss and give critical feedback about the student's performance. Students developed their critical thinking regarding their performance in front of the pupils, but also for performance of other students.

Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	**C6. Civic-mindedness** D33. Expresses a willingness to co-operate and work with others (B) **C9. Tolerance of ambiguity** D50. Engages well with other people who have a variety of different points of view (B) **C16. Co-operation skills** D94. Builds positive relationships with other people in a group (B) D99. When working with others, supports other people despite differences in points of view (A) D33, D50, D94 and D99 were addressed when students prepared joint lesson plan before delivering the lecture at the university. The students had the freedom to make their own presentations and use their own style of expression, but they did the process of preparing for the lesson in collaboration and helping each other. **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I) D70 and D73 which represent the skill of listening and observing were very important during school lesson observations. Students observed two lessons in high-school and discussed it afterwards with the mentors and the lecturer. During the plenary sessions, students, mentors and the lecturer had a chance to honestly discuss and give critical feedback about the student's performance, thus building a strong relationship of trust (D109). Thanks to such conversations, the students were able to improve the their teaching.
General remarks by the lecturer:	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. The opportunity for students to observe the mentors' classes, as well as to participate in the teaching process as teachers is a very valuable experience for them. However, both the mentors and the lecturer had the opportunity to learn something new by observing the lessons and to improve their practice.

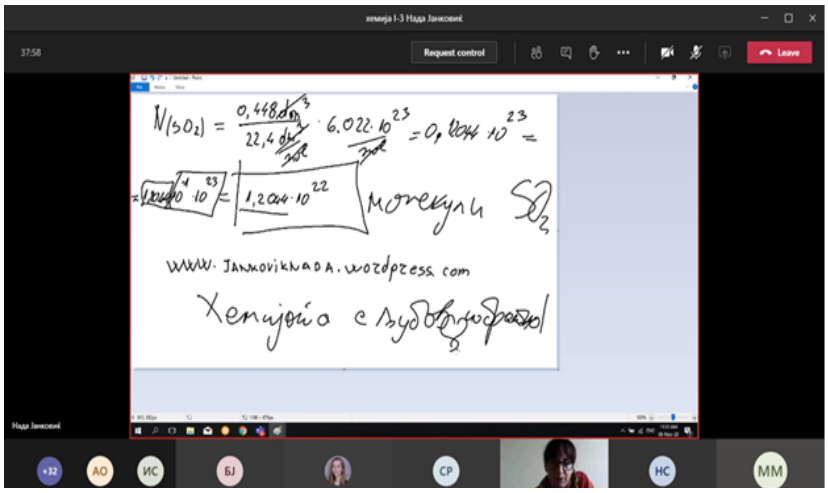


Figure 3. Students' class observation in secondary school

Session 6: Introduction to teaching methods

Chemistry Content: Introduction to teaching methods

Democracy Content: Charing plenary sessions (discussion and critical thinking), Task-based learning

Competences for Democratic Culture: No. 7, 8, 10, 12, 18

Date: 16.11.2020 **18.11.2020** **Depends on school schedule**	**Time: 10:00–12:30** **10:00–12:15** **Depends on school schedule** (2 school classes of observation, 3 school classes of practical work and 45 min. of plenary sessions)	**Room: 308 or online** **Room: 308 or online Primary/ secondary school**
Session No. 6		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Introduction to teaching methods		
Overview, issues addressed:	• Introduction to teaching methods • Charing plenary sessions (discussion and critical thinking) • Observing and delivering different types of lessons at the faculty and in the school		
Aims and learning outcomes:	• Knowledge and understanding of different teaching methods • Supporting discussion and critical thinking • Critical review and evaluation of their own and other students' teaching		
Practice teaching elements included:	Observing and delivering different types of lessons at the university and in the primary/ secondary school		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	20%	**20 %**	**60%**
Practice teaching format used:	■ mock model lesson at the University by lecturer ■ by student ☐ model class in schools ■ by student ■ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C) and descriptors (D) to be applied or trained:	**C7 Responsibility** D41 Submits required work on time (I) **C8 Self-efficacy** D45 Expresses the belief that he/she can carry out activities that he/she has planned (B) **C10 Autonomous learning skills** D62 Can select the most reliable sources of information or advice from the range available (A) **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I)		

Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-12:30: room 308 – small-group classroom or online, day 1 10:00-12:15: room 308 – small-group classroom or online, day 2 2 school classes of observation in primary/secondary school 3 school classes of practical work (teaching) in primary/secondary school and 45 minutes plenary sessions
Materials needed	• Notebooks • National curricula and chemistry textbooks • Other, depending on the teaching method (e.g., laboratory equipment and chemicals, molecular models, posters, …)

Part II – Session step by step:

School practice and group work/discussions: time depends on school schedule

Part 1: Time depends on school schedule (2 classes – observation in school)
Task for students:
Students listen effectively and observe the way chemistry teacher leads and manages the class in the classroom (different teaching methods should be covered). Students summarize their impressions by writing notes.

Lecture and group work/discussions: 16.11.2020, 10:00 – 12:30

Part 1: 10:00 – 10:20
Task for students:
Plenary sessions: Students express and summarize their impressions from school class observation and compare them with each other to discover the teaching method in question and to evaluate the way the teacher teaches, emphasizing the things that left the strongest impression on them, as well as the things that they did not like.

Part 2: 10:20-10:30
Lecturer:
Lecturer encourages every student to participate and share his/her opinion and makes sure that students share their criteria for judgment and reflect the reasons for their choice of criteria (competence of judgment or interactive constructivist learning).

Part 3: 10:30-11:15
Lecturer:
Classification and discussion of teaching methods in chemistry (lecturing in front of the class, explaining, problem-based learning, conversation, discussion, laboratory work, working on textbook and other written materials, chemistry dictation, self-learning, research-based learning, project-based learning, game-based learning) – discussion through examples. Formation of concepts and representations in chemistry teaching.

Part 4: 11:15 – 11:45
Task for students:
Students choose one topic from chemistry textbook and illustrate suitable teaching methods for given lessons within thematic planning.
Students exchange working papers and perform peer group evaluation.

Part 5: 11:45 – 12:15
Lecturer:
Mock lesson. Demonstration of experimental problem-based task as part of the task-based learning – Determining the unknown substance (NaCl, Na_2CO_3 and Na_2SO_4).
Lecturer shows an example of interactive teaching to create a productive and exciting learning environment. By integrating thinking and doing, lecturer tries to give all students an idea of why they should learn by doing, and stresses that solving real-life problems requires many abilities and skills.
Lecturer follows the elements of task-based learning:
1.The students face a task that needs to be solved (presented either by the teacher or a textbook).
2.The students plan their action.
3.The students implement their action plan.
4.The students reflect on their process of learning and present their results.

Part 6: 12:15– 12:20
Homework assignment:
Students should plan the realization of given lesson and develop lesson plan, integrating the descriptors of competence. Prepare daily planning using problem-based task approach.

(approximately 1.5-hour individual student's preparation)

Part 7: 12:20 – 12:30
Debriefing and evaluation of the session:
We will have a possibility for students to give remarks and comments about the issues discussed in the lesson.

School practice and group work/discussions: 18.11.2020, 10:00 – 12:15

Part 1: 10:00-11:30

Task for students:

Students deliver lessons at the university according to the previously developed lesson plan.

Part 2: 11:30-12:45

Lecturer:

Lecturer, together with other students, gives feedback regarding the realization of the lesson by the student.

School practice and group work/discussions: Time depends on school schedule (3 classes practical work in school and 45 minutes plenary sessions)

Part 1:

Task for students: (3 classes practical work in school)

Students adapt and improve the lessons delivered at faculty and deliver the same lessons in the school.

Part 2:

Task for students: 30 min.

Plenary session: Students have to critically review and reflect their own and other students' teaching and recommend ways for improvement. Each student has to identify at least one descriptor for his/her lesson implemented with pupils in school context and explain his/her choice.

Part 3:

Debriefing and evaluation of the session: 15 min.

We will have a short possibility for students to give remarks and comments about their performance in the classroom. Students summarize comments from the lecturer and other students and reflect their own performance by writing notes.

Part III – Report (Debriefing and evaluation):

General remarks from students:	Students gave opinions about the teacher's lectures in front of the pupils, as well as about the their colleagues' lectures. They observed two classes in 8th grade, and the topic was Periodic Table. Students gave usual remarks about the time management, the teacher's attitude towards the students, as well as their mutual communication. Some of their comments regarding the teacher's teaching in the class were: •The pupil who was talking had to have a camera on for better communication with the teacher. •The teacher asks the same question to several pupils to show how important that is. •While the teacher is assessing several students, she is giving assignments to the others during the lesson. •The teacher asks higher order questions to check the understanding of pupils. •I liked the associations that the teachers use: e.g., the atomic number is the ID of an atom, 18 groups in the Periodic Table – as when you'll reach adulthood, 7 periods in the Periodic Table as when you get 7 on lottery.

Debriefing of the Chemistry Content including homework	The chemistry topic consisted of classification and discussion about different teaching methods in chemistry, giving suitable examples. Students had an assignment to prepare problem-based task that can be implemented in the classroom. Some of students' examples are listed below: - When talking about oxides, the teacher poses the following problem task: How many grams of calcium oxide (CaO) will be obtained by heating 2 t limestone containing 94.6 % $CaCO_3$? - When reviewing the lessons for obtaining salts, the teacher gives a formula of a salt and asks the pupils to suggest a method to obtain it, to list the laboratory equipment needed and to explain the procedure for obtaining it. - A solution of unknown salt is assigned to each group (different for each group). Pupils use litmus paper (or universal indicator paper) to determine if the medium is acidic, basic, or neutral based on the salt hydrolysis. - Problem description: What is the pH value if c(HCl) = $5 \cdot 10^{-8}$ mol/dm^3? The result is pH = 7.3, which is contrary to the theoretically expected pH < 7.
Debriefing of the Democracy (EDC/ HRE) content	The lecturer demonstrated experimental problem-based task as part of the task-based learning – Determining the unknown substance (the substance could be one of the following: NaCl, Na_2CO_3 and Na_2SO_4). This is an example of interactive teaching and the lecturer tried, by integrating thinking and doing, to give all students an idea of why they should learn by doing, and to stress that solving real-life problems requires many abilities and skills. The elements of task-based learning were followed and students were asked to do the same. Students, in addition to observing and discussing lessons implemented by mentors, were required to prepare their own lesson plan for a primary school lesson and deliver a class (first at university and then in school). Of invaluable importance for the further development of future teachers is the reflection after the classes and listening to different opinions and suggestions from their colleagues, mentors and lecturer, such as: •listens to the students, and if the answer is wrong, corrects them •not to put his hand in front of his mouth when teaching •to use proper Macedonian language •it is better to take the chemical symbols of carbon and chlorine as an example because they have the same initial letter
Debriefing of the RFCDC: Competences (C) and descriptors (D) applied or trained:	**C7 Responsibility** D41 Submits required work on time (I) **C10 Autonomous learning skills** D62 Can select the most reliable sources of information or advice from the range available (A) D41 and D62 were addressed when students prepared their homework about the problem-based task to be implement as classroom activity. From range of activities, they should select the ones that involve problem-based approach and are suitable for a particular age of students. **C8 Self-efficacy** D45 Expresses the belief that he/she can carry out activities that he/she has planned (B) **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I) These descriptors are important when students observe lessons in school delivered by mentors and further discuss with the mentors, lecturer and other students.
General remarks by the lecturer:	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. Students are gaining knowledge and experience and feel more comfortable discussing their lessons as well as mentor's lessons.

Session 7: Teaching methods in chemistry

Chemistry Content: Teaching methods in chemistry

Democracy Content: Teaching controversial issues

Competences for Democratic Culture: No. 5, 6, 12, 15, 17, 18

Date: 23.11.2020 **25.11.2020**	**Time: 10:00–12:15** **10:00–12:15** **Depends on school schedule** (2 school classes of observation, 3 school classes of practical work and 45 min. of plenary sessions)	**Room: 308 or online** **Room: 308 or online Primary/ secondary school**
Session No. 7		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Teaching methods in chemistry		
Overview, issues addressed:	• Different teaching methods and their applicability in chemistry teaching • Controversial issues • Observing and delivering lessons at the university and in the school using different teaching methods		
Aims and learning outcomes:	• Identification and implementation of specific teaching methods in chemistry • Addressing controversial issues • Understanding other people's points of view in teaching controversial issues • Critical review of their own and other students' teaching		
Practice teaching elements included:	Model class prepared and implemented by the lecturer (Teaching controversial issues). Students as active participants. Observing and delivering lessons at the university and in the school using different teaching methods		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	30%	**10 %**	**60%**
Practice teaching format used:	■ mock model lesson at the University by lecturer ■ by student ☐ model class in schools ■ by student ■ classroom teacher ☐ lecturer ☐ other format (specify):		

RFCDC: Competences (C)and descriptors (D) to be applied or trained:	**C5 Respect** D27 Gives space to others to express themselves (B) **C6 Civic-mindedness** D36 Discusses what can be done to help make the community a better place (I) **C12 Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73 Can listen effectively in order to decipher another person's meanings and intentions (I) **C15 Linguistic, communicative and plurilingual skills** D88 Can express his/her thoughts on a problem (B) **C17 Conflict-resolution skills** D103 Can encourage the parties involved in conflicts to actively listen to each other and share their issues and concerns(I) **C18 Knowledge and critical understanding of the self** D109 Can reflect critically on himself/herself from a number of different perspectives (I)
Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-12:15: room 308 – small-group classroom Time depends on school schedule: student classroom in primary/secondary school
Materials needed	• Chemistry textbooks, national chemistry curricula, notebooks • Laboratory equipment and chemicals • Molecular models • Living with Controversy – Teaching Controversial Issues Through Education for Democratic Citizenship and Human Rights (EDC/HRE), https://rm.coe.int/16806948b6

Part II – Session step by step:

School practice and group work/discussions: time depends on school schedule

Part 1: Time depends on school schedule (2 classes – observation in school)

Task for students:

Students listen effectively and observe the way chemistry teacher leads and manages the class in the classroom (different teaching methods should be covered). Students summarize their impressions by writing notes.

Lecture and group work/discussions: 23.11.2020, 10:00 – 12:15

Part 1: 10:00 – 10:30

Lecturer:

Gives overview about students' homework related to the material learned in the previous session – implementation of different teaching methods within students' thematic planning.

Discusses about different teaching methods – making connections with the material taught at the previous class.

Elaborates the usage of specific teaching methods in chemistry:

- Practical use of molecular models in chemistry teaching
- Performing simple school experiment
- Virtual laboratories

Part 2: 10:30 – 11:00

Task for students:

Students select suitable topic from the chemistry textbook and categorize lessons according to the curricula and thematic planning to propose appropriate teaching method for each lesson (15 min.).

Students elaborate and discuss ideas among them. Each student modifies the tentative lesson plans based on the discussion (10 min.).

Students build molecular models for characteristic inorganic and organic substances (5 min.).

Part 3: 11:00 – 11:10

Task for students:

Brainstorming ideas from the Activity 2.4: Other people's shoes (pp. 55-56) from the book Living with Controversy – Teaching Controversial Issues Through Education for Democratic Citizenship and Human Rights (EDC/HRE). Students express and summarize their findings and compare them with each other to formulate a question concerning a controversial topic.

Part 3: 11:10 – 11:25

Lecturer:

Lecturer discusses controversial issues that can be further discussed in the classroom and explains the importance of dealing with these issues. Lecturer gives examples from previous discussion with students and from the book Living with Controversy – Teaching Controversial Issues Through Education for Democratic Citizenship and Human Rights (EDC/HRE).

Part 4: 11:25 – 12:00

Model class learning:
Lecturer gives brief introduction to the topic in question and emphasizes the importance of science and technology in the development of a society. In our daily life, science is everywhere – the food we eat, the clothes we wear, the house we live in, the transport we use, the medicine we take when we are sick, the fire we use for cooking, etc. Scientific achievements make life easier and aim to make the world better place. Still, they are not easy to achieve, and often many hard decisions and many sacrifices are needed to accomplish the goal.
Science and technology are embedded in every aspect of modern life. Thus, people need to integrate information from science with their personal values to make important life decisions. Many controversies over science and society are present today, such as safety of foods, global warming and climate change, sustainable energy, environmental degradation, biomedical interventions into life, nuclear power, genetic engineering etc. Some of these science controversies are:

- 88% of scientist said that genetically modified foods are safe to eat, but only 37% of the public agreed;
- 86% of scientist said that the MMR (measles, mumps, and rubella) vaccine should be mandatory , compared with 68% of the public; and
- 87% of scientist thought that climate change is mostly due to human activity, but only 50% of the public was in agreement.

Lecturer initiates a discussion with the students about the process of discovering a new medicine and the path that needs to be taken to its final use. Lecturer continues the discussion by asking students to examine the aspects doctors should consider when creating a new medicine? The lecturer encourages students to show and defend their opinions.
Lecturer writes on the whiteboard the question: Are doctors allowed and should they perform experiments on humans when creating a new medicine?
Students have a minute to analyse the question for themselves, not revealing nor discussing their opinions.
Lecturer gives further guidelines to students – all students whose answer is YES go to the left side of the room, and all whose answer is NO go to the right side. No undecided answers are accepted.
Then, lecturer poses additional question for students to think about: Did you make your decision by reason or by heart? Again, students have a minute to analyse the question for themselves, not revealing nor discussing their opinions. Students decide which group they belong to, based on their beliefs.

Next, students are split in two additional groups, thus forming four groups:
Yes, by reason
Yes, by heart
No, by reason
No, by heart
The lesson continues by giving students from each group a chance to interpret their choice and to explain their own point of view. Then, student from one group passes to another group, and tries to imagine how students from this group feel (put yourself in other people's shoes). One or more students do the same. Students identify alternative points of view and explore ways to see a range of perspectives. (30 min.)

Task for students:
Students are required to identify and justify at least one statement in favour of each of the four positions. (5 min.)

Part 5: 12:00 – 12:05
Presenting homework:
To explore other activities in the book Living with Controversy – Teaching Controversial Issues Through Education for Democratic Citizenship and Human Rights (EDC/HRE)
To think of a controversial issue and pose it in the form of a question (https://rm.coe.int/16806948b6) and to write short essay on how to adapt discussion or debate within chemistry (science) content and to illustrate one good-practice example in chemistry teaching involving controversial issue.
Students should plan the realization of given lesson and develop lesson plan, integrating the descriptors of competence. Prepare daily planning using problem-based task approach. (approximately 1.5-hour individual student's preparation)

Part 6: 12:05 – 12:15
Debriefing and evaluation of the session:
We will have a short possibility for students to give remarks and comments about the implementation of teaching methods in chemistry and discussing controversial issues in chemistry classes.

School practice and group work/discussions: 25.11.2020, 10:00 – 12:15

Part 1: 10:00-11:30

Task for students:

Students deliver lessons at the university according to the previously developed lesson plan.

Part 2: 11:30-12:45

Lecturer:

Lecturer, together with other students, gives feedback regarding the realization of the lesson by the student.

School practice and group work/discussions: Time depends on school schedule (3 classes practical work in school and 45 minutes plenary sessions)

Part 1:

Task for students: (3 classes practical work in school)

Students adapt and improve the lessons delivered at university and deliver the same lessons in the school.

Part 2:

Task for students: 30 min.

Plenary session: Students have to critically review and reflect their own and other students teaching and recommend ways for improvement. Each student has to identify at least one descriptor for his/her lesson implemented with pupils in school context and explain his/her choice.

Part 3:

Debriefing and evaluation of the session: 15 min.

We will have a short possibility for students to give remarks and comments about their performance in the classroom. Students summarize comments from the lecturer and other students and reflect their own performance by writing notes

Part III – Report (Debriefing and evaluation):

General remarks from students:	Students gave opinions about the teacher's lectures in front of the pupils, as well as about the their colleagues' lectures. They observed two classes in 8th grade, and the lesson was revision about Periodic Table. Students gave usual remarks about the time management, the teacher's attitude towards the students, as well as their mutual communication. The students were impressed by the quiz the teacher has prepared using online tools. All pupils were actively involved in this activity, and the time was well planned. Some of the comments regarding the students' teaching in the class were: •said the basic concepts and then inserted a quiz, which is good because it activates the students and the class is not monotonous •the voice trembles •better to ask two separate questions than two requests in one question •the teacher should decide whether to give time for thinking or to call a volunteer, not to leave this choice to the students
Debriefing of the Chemistry Content including homework	The chemistry topic consisted of identification and implementation of specific teaching methods in chemistry, giving suitable examples. The idea was students to be able to connect the content of the lesson to an appropriate teaching method, and not only to propose the teaching method, but to elaborate the reason for choosing it. Also, students showed that they are able to listen to the opinions of the colleagues and to implement their suggestions.

Debriefing of the Democracy (EDC/ HRE) content	In session 7 we continued our discussion on teaching methods, but we were more focused on how to incorporate discussion about controversial issues in the lesson. The lecturer started by discussing controversial issues and explaining the importance of dealing with these issues. Then she gave an example of a controversial topic related to science – Are doctors allowed and should they perform experiments on humans when creating a new medicine? Regarding the situation with COVID-19, it was expected that students would connect this topic with the discovery of a vaccine and the testing needed for this matter. There was a discussion about the time required for testing, the side effects, the impact of other medications, the competition of pharmaceutical companies at local, regional and global level and so on. One student, who had a deeper knowledge of pharmacy, explained the time-consuming process and hard work required to make an analysis – how many people are involved, how much it costs, whether laboratory mice are being tested, and how the effects manifested are being monitored, how the medication works on the brain, liver ... Then, will there be volunteers who will undergo such testing. Regarding the students' beliefs: - three chose "No, by reason", explaining that it is not wise to start experiments on humans, and that this should be voluntarily - two chose "Yes, by reason", saying that experiments must be done on humans, because humans can react differently from animals, and that if we had not performed experiments on humans, we would still have had diseases like measles. We have to give up something in order to get something. - one student chose "No, by heart" because she thought that it could have serious consequences for people's lives and she felt sorry for the people who would lose their lives After that, students needed to think of good-practice example in chemistry teaching involving controversial issue. And here are some of them: •Internet and gaming addiction •Are teens at risk? Should there be access restrictions? •Do you think that vitamins can be taken freely, without consulting a doctor? •Is marijuana use harmful or beneficial to human health?
Debriefing of the RFCDC: Competences (C) and descriptors (D) applied or trained:	**C5 Respect** D27 Gives space to others to express themselves (B) **C6 Civic-mindedness** D36 Discusses what can be done to help make the community a better place (I) **C15 Linguistic, communicative and plurilingual skills** D88 Can express his/her thoughts on a problem (B) **C17 Conflict-resolution skills** D103 Can encourage the parties involved in conflicts to actively listen to each other and share their issues and concerns(I) All these descriptors were addressed during the discussion about controversial issues, both those proposed by the lecturer and those by the students. Students analysed the questions by themselves, expressed and defended their opinions, and interpreted and explained their point of view. **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I) These descriptors were addressed when students observed lessons in school delivered by mentors, themselves or other students, and during the discussion with the mentors, lecturer and other students.
General remarks by the lecturer:	Generally, students thought that it is good sometimes to have a discussion on controversial topics in class. Pupils can hear different opinions and they have the opportunity to express their own opinion. In that way we learn to be patient, not to rush to conclusions. We learn how to listen to the person who is speaking and not to judge him. We put ourselves in his role and try to understand him better. Students think that such discussions on various topics should be more frequent in teaching.

Session 8: Graphical tools for organization and visualization in chemistry teaching

Chemistry Content: Graphical tools for organization and visualization in chemistry teaching

Democracy Content: Debating, dilemmas

Competences for Democratic Culture: No. 5, 9, 12, 15, 18

Date: 30.11.2020 **02.12.2020** **Depends on school schedule**	**Time: 10:00–12:30** **10:00–12:15** **Depends on school schedule** (2 school classes of observation, 3 school classes of practical work and 45 min. of plenary sessions)	**Room: 308 or online** **Room: 308 or online Primary/ secondary school**
Session No. 8		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Graphical tools for organization and visualization in chemistry teaching		
Overview, issues addressed:	• Introduction to graphical tools • Elaboration of the importance of discussion and debate in chemistry teaching • Observing and delivering different types of lessons at the university and in the school		
Aims and learning outcomes:	• Knowledge and understanding of the use of graphical tools in chemistry teaching • Supporting discussion and debate • Critical review and evaluation of their own and other students' teaching		
Practice teaching elements included:	Observing and delivering different types of lessons at the university and in the primary/ secondary school		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	20%	**20 %**	**60%**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ■ by student ☐ model class in schools ■ by student ■ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C) and descriptors (D) to be applied or trained:	**C5 Respect** D27 Gives space to others to express themselves (B) **C9 Tolerance of ambiguity** D50 Engages well with other people who have a variety of different points of view (B) **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C15 Linguistic, communicative and plurilingual skills** D88 Can express his/her thoughts on a problem (B) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I)		

Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-12:30: room 308 – small-group classroom or online, day 1 10:00-12:15: room 308 – small-group classroom or online, day 2 2 school classes of observation in primary/secondary school 3 school classes of practical work (teaching) in primary/secondary school and 45 minutes of plenary sessions
Materials needed	• Notebooks • National curricula and chemistry textbooks • Other, depending on the teaching method (e.g., laboratory equipment and chemicals, molecular models, posters, …)

Part II – Session step by step:

School practice and group work/discussions: time depends on school schedule

Part 1: Time depends on school schedule (2 classes – observation in school)

Task for students:

Students listen effectively and observe the way chemistry teacher leads and manages the class in the classroom (different teaching methods should be covered). Students summarize their impressions by writing notes.

Lecture and group work/discussions: 30.11.2020, 10:00 – 12:30

Part 1: 10:00 – 10:20

Task for students:

Plenary sessions: Students express and summarize their impressions from school class observation and compare them with each other to discover the teaching method in question and to evaluate the way the teacher teaches, emphasizing the things that left the strongest impression on them, as well as the things that they did not like.

Part 2: 10:20-10:30

Lecturer:

Lecturer encourages every student to participate and share his/her opinion and makes sure that students share their criteria for judgment and reflect the reasons for their choice of criteria (competence of judgment or interactive constructivist learning).

Part 3: 10:30-11:15

Lecturer:

Introducing graphical tools for organization and visualization in chemistry teaching (clustering, T-chart, E-chart, Venn Diagram, continuum, comparison matrix, chain of events, linear string, sense chart, cycle, KWL chart, …).

Part 4: 11:15 – 11:45

Task for students:

Students choose tree lessons from chemistry textbooks and illustrate suitable graphical tools for delivering the content. Discussion.

Part 5: 11:45 – 12:15
Lecturer:
Elaborates the importance of discussion and debate in chemistry teaching. Discussion about various chemistry topics that provoke discussion (pros and cons of sulphuric acid, using wood for heating, true position of hydrogen in the Periodic Table) and visual representation through graphical organizers

Part 6: 12:15– 12:20

Homework assignment:
Students should plan the realization of given lesson and develop lesson plan, integrating the descriptors of competence. Prepare daily planning using graphical tools.

(approximately 1.5-hour individual student's preparation)

Part 7: 12:20 – 12:30
Debriefing and evaluation of the session:
We will have a possibility for students to give remarks and comments about the issues discussed in the lesson.

School practice and group work/discussions: 02.12.2020, 10:00 – 12:15

Part 1: 10:00-11:30
Task for students:
Students deliver lessons at the university according to the previously developed lesson plan.

Part 2: 11:30-12:15
Lecturer:
Lecturer, together with other students, gives feedback regarding the lesson implementation by the student.

School practice and group work/discussions: Time depends on school schedule (3 classes of practical work in school and 45 minutes of plenary sessions)

Part 1:
Task for students: (3 classes of practical work in school)
Students adapt and improve the lessons delivered at faculty and deliver the same lessons in the school.

Part 2:
Task for students: 30 min.
Plenary session: Students have to critically review and reflect their own and other students teaching and recommend ways for improvement. Each student has to identify at least one descriptor for his/her lesson implemented with pupils in school context and explain his/her choice.

Part 3:
Debriefing and evaluation of the session: 15 min.
We will have a short possibility for students to give remarks and comments about their performance in the classroom. Students summarize comments from the lecturer and other students and reflect their own performance by writing notes.

Part III – Report (Debriefing and evaluation):

General remarks from students:	Students gave opinions about the teachers' lectures in front of the pupils, as well as about the their colleagues' lectures. They observed one class in 6th grade (science course – revision about human organ systems) and one in 2nd year high-school (chemistry course – activated-complex theory). Students gave usual remarks about the time management, the teacher's attitude towards the students, as well as their mutual communication. Some of their comments regarding the teachers' teaching in the class were: - I liked that she started the lesson by connecting with everyday life, e.g. what is the meaning of the word complex? - Some parts of the presentation were not translated from English. - The teacher asked excellent questions to check if the students really understood the concepts. - Kahoot is a great tool to test students' knowledge in an interesting way.
Debriefing of the Chemistry Content including homework	The chemistry topic consisted of knowledge and discussion about different types of graphical tools in chemistry teaching, and the way these types of tools can reinforce analytical and critical thinking and improve the overall conceptual knowledge of students. The students showed this by developing a lesson plan and delivering a lesson using graphical organizers.
Debriefing of the Democracy (EDC/HRE) content	During university classes, as well as after school classes, an exchange of ideas and discussion on various aspects of the lectures was used. This encourages communication between the teacher and students through debate and dilemmas (suggested discussions involved pros and cons of sulphuric acid, using wood for heating, true position of hydrogen in the Periodic Table).
Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	**C5 Respect** D27 Gives space to others to express themselves (B) **C9 Tolerance of ambiguity** D50 Engages well with other people who have a variety of different points of view (B) **C15 Linguistic, communicative and plurilingual skills** D88 Can express his/her thoughts on a problem (B) These descriptors describe the most important characteristics that I think should be present in every person who is involved in some kind of discussion. Everyone should be able to express their opinion, but also to listen to others and think from a different perspective. This was also noticed in the students during this session. **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I) These descriptors are important and were addressed when students observed or delivered lessons and further discussed with the mentors, lecturer and other students.
General remarks by the lecturer:	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. It is noticeable that the students are more confident and more creative due to the experience gained so far.

Session 9: Sources of scientific knowledge

Chemistry Content: Sources of scientific knowledge

Democracy Content: Skills and strategies for media literacy

Competences for Democratic Culture: No. 10, 12, 14, 18

Date: 07.12.2020 **09.12.2020** **Depends on school schedule**	**Time: 10:00–12:00** **10:00–12:15** **Depends on school schedule** (3 school classes of practical work and 45 min. of plenary sessions)	**Room: 308 or online** **Room: 308 or online Primary/ secondary school**
Session No. 9		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Sources of scientific knowledge		
Overview, issues addressed:	• Introduction to various sources of scientific knowledge • Elaboration of the importance of media in chemistry teaching • Delivering different types of lessons at the university and in the school		
Aims and learning outcomes:	• Knowledge and understanding of the sources of scientific knowledge • Application of the media in chemistry teaching • Critical review and evaluation of their own and other students' teaching		
Practice teaching elements included:	Delivering different types of lessons at the university and in the primary/secondary school		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	30%	**20 %**	**50%**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ■ by student ☐ model class in schools ■ by student ☐ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C) and descriptors (D) to be applied or trained:	**C10 Autonomous learning skills** D58 Shows ability to identify resources for learning (e.g., people, books, internet) (B) D62 Can select the most reliable sources of information or advice from the range available (A) **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C14 Flexibility and adaptability** D84 Adapts to new situations by using a new skill (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I)		

Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-12:00: room 308 – small-group classroom or online, day 1 10:00-12:15: room 308 – small-group classroom or online, day 2 3 school classes of practical work (teaching) in primary/secondary school and 45 minutes of plenary sessions
Materials needed	• Notebooks • National curricula and chemistry textbooks • Other, depending on the teaching method (e.g., laboratory equipment and chemicals, molecular models, posters, …)

Part II – Session step by step:

Lecture and group work/discussions: 30.11.2020, 10:00 – 12:00

Part 1: 10:00-10:45
Lecturer:

Lecturer introduces various sources of scientific knowledge in chemistry teaching (observation, students' experience, experiments, teacher's word, textbooks and other literature, internet).

Lecturer elaborates the need of various sources of scientific knowledge in chemistry teaching.

Part 2: 10:45 – 11:30

Task for students:

Students present a webpage/application/simulation for chemistry according to their previous preparation.

Part 3: 11:30– 11:40

Homework assignment:

Students should plan the realization of given lesson and develop lesson plan, integrating the descriptors of competence. Prepare daily planning using ICT/PhET simulations.

(this task was given earlier because it takes more time to prepare)

Part 7: 11:40 – 12:00

Debriefing and evaluation of the session:

We will have a possibility for students to give remarks and comments about the issues discussed in the lesson.

School practice and group work/discussions: 09.12.2020, 10:00 – 12:15

Part 1: 10:00-11:30

Task for students:

Students deliver lessons at the university according to the previously developed lesson plan.

Part 2: 11:30-12:15

Lecturer:

Lecturer, together with other students, gives feedback regarding the implementation of the lesson by the student.

School practice and group work/discussions: Time depends on school schedule (3 classes practical of work in school and 45 minutes of plenary sessions)

Part 1:

Task for students: (3 classes practical work in school)

Students adapt and improve the lessons delivered at faculty and deliver the same lessons in the school.

Part 2:

Task for students: 30 min.

Plenary session: Students have to critically review and reflect their own and other students teaching and recommend ways for improvement. Each student has to identify at least one descriptor for his/her lesson implemented with pupils in school context and explain his/her choice.

Part 3:

Debriefing and evaluation of the session: 15 min.

We will have a short possibility for students to give remarks and comments about their performance in the classroom. Students summarize comments from the lecturer and other students and reflect their own performance by writing notes.

Part III – Report (Debriefing and evaluation):

General remarks from students:	Students gave reflection about the their colleagues' lectures as well as of their own. Regarding students' implementation of lessons in school, some of the comments were: •it is better to use the same substance example for an empirical and molecular formula •changes slides very quickly and pupils do not have time to write in their notebook •the question "why Pb_2S_4 is not the correct formula" is great •calcium phosphate is not a molecule but a formula unit
Debriefing of the Chemistry Content including homework	The chemistry topic consisted usage of various sources of scientific knowledge in chemistry teaching, including the importance of media. The students showed this by developing a lesson plan as a base for upcoming realization of a lesson using ICT/ PhET simulations.
Debriefing of the Democracy (EDC/HRE) content	Students had an assignment to do a web-based search, and to select useful webpages and applications for chemistry to present in the class. The web page https://commons.wikimedia.org/wiki/Category:Chemistry_experiments_by_Shared_Knowledge was pointed out to students as an example of video experiments prepared by professors from the Institute of Chemistry, Faculty of Natural Sciences and Mathematics.

Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	**C10 Autonomous learning skills** D58 Shows ability to identify resources for learning (e.g., people, books, internet) (B) D62 Can select the most reliable sources of information or advice from the range available (A) **C14 Flexibility and adaptability** D84 Adapts to new situations by using a new skill (I) Nowadays it is very important to follow the novelties in teaching which may include completely new tools and approaches. The use of ICT in teaching has long been present, but not always properly and fully applied. The idea of introducing such a discussion in this session was to point out to students different ways of using ICT that would really be in function of deepening students' knowledge and better understanding of concepts and phenomena in chemistry. In addition, great attention was paid to their independent work and focus on proper and relevant search. **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I) These descriptors were addressed when students deliver lessons and further discuss with the mentors, lecturer and other students.
General remarks by the lecturer:	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. This was an interesting session for everyone because it involved young people (students) who are familiar with new technologies and see their application in teaching as an advantage.

Session 10: Assessment in chemistry

Chemistry Content: Assessment in chemistry

Democracy Content: /

Competences for Democratic Culture: No. 7, 12, 18

Date: 14.12.2020 **16.12.2020** **Depends on school schedule**	**Time: 10:00–12:30** **10:00–12:15** **Depends on school schedule** (3 school classes of practical work and 45 min. of plenary sessions)	**Room: 308 or online** Room: 308 or online Primary/ secondary school
Session No. 10		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Assessment in chemistry		
Overview, issues addressed:	• Introduction to formative and summative assessment • Elaboration of different assessment methods • Delivering different types of lessons at the university and in the school		
Aims and learning outcomes:	• Knowledge and understanding of the formative and summative assessment • Critical review and evaluation of their own and other students' teaching		
Practice teaching elements included:	Delivering different types of lessons at the university and in the primary/secondary school		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	40%	**30 %**	**30%**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ■ by student ☐ model class in schools ■ by student ☐ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C)and descriptors (D) to be applied or trained:	**C7 Responsibility** D41 Submits required work on time (I) **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I)		

Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-12:30: room 308 – small-group classroom or online, day 1 10:00-12:15: room 308 – small-group classroom or online, day 2 3 school classes of practical work (teaching) in primary/secondary school and 45 minutes of plenary sessions
Materials needed	• Notebooks • National curricula and chemistry textbooks • Other, depending on the teaching method (e.g., laboratory equipment and chemicals, molecular models, posters, …)

Part II – Session step by step:

Lecture and group work/discussions: 14.12.2020, 10:00 – 12:30

Part 1: 10:00-10:45
Lecturer:
Lecturer introduces formative and summative assessment and different assessment methods (self-assessment, conversation, portfolio, concept maps, asking question, observation, tests).

Part 2: 10:45 – 11:15
Task for students:
Students discuss and share their opinions and experiences about the objectivity of assessment.

Part 3: 11:15– 12:00
Lecturer:
Lecturer introduces the term misconception and elaborates its importance in chemistry teaching in forming conceptions and conceptual networks in students.
Lecturer presents the results based on relevant research.

Part 4: 12:00 – 12:15
Task for students:
Students express their own experiences regarding presented material.
Part 5: 12:15 – 12:20
Presenting homework:
Students should develop a knowledge test including elements students consider relevant.

Part 6: 12:20 – 12:30
Debriefing and evaluation of the session:
We will have a possibility for students to give remarks and comments about the issues discussed in the lesson.

School practice and group work/discussions: 16.12.2020, 10:00 – 12:15

Part 1: 10:00-11:30

Task for students:

Students deliver lessons at the university according to the previously developed lesson plan.

Part 2: 11:30-12:15

Lecturer:

Lecturer, together with other students, gives feedback regarding the implementation of the lesson by the student.

School practice and group work/discussions: Time depends on school schedule (3 classes of practical work in school and 45 minutes of plenary sessions)

Part 1:

Task for students: (3 classes practical work in school)

Students adapt and improve lessons delivered at faculty and deliver the same lessons in the school.

Part 2:

Task for students: 30 min.

Plenary session: Students have to critically review and reflect their own and other students teaching and recommend ways for improvement. Each student has to identify at least one descriptor for his/her lesson implemented with pupils in school context and explain his/her choice.

Part 3:

Debriefing and evaluation of the session: 15 min.

We will have a short possibility for students to give remarks and comments about their performance in the classroom. Students summarize comments from the lecturer and other students and reflect their own performance by writing notes.

Part III – Report (Debriefing and evaluation):

General remarks from students:	Students gave reflection about the their colleagues' lectures as well as of their own. Regarding students' implementation of lessons in school, some of the comments were: •the tone of speaking is more like at the exam than as in a classroom •time is well planned •beautiful presentation, dynamic and interactive, it takes time and effort to do this, and it should be appreciated •to congratulate the student for her persistence in facing the technical problems
Debriefing of the Chemistry Content including homework	The chemistry topic consisted usage of various methods used to assess the content knowledge of pupils, including both formative and summative assessment. The students showed their understanding of assessment methods by designing knowledge tests.
Debriefing of the Democracy (EDC/HRE) content	/
Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	**C7 Responsibility** D41 Submits required work on time (I) D41 was addressed when students were given assignments to develop a knowledge test including elements students consider relevant and when preparing a lesson plan for implementation of a lesson at the university and in school. **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I) These descriptors were addressed when students deliver lessons and further discuss with the mentors, lecturer and other students.
General remarks by the lecturer	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams.

Session 11: Development of knowledge tests

Chemistry Content: Development of knowledge tests

Democracy Content: /

Competences for Democratic Culture: No. 8, 10, 12, 18

Date: 21.12.2020 **23.12.2020**	**Time: 10:00–11:30** **10:00–13:30**	**Room: 308 or online** Room: 308 or online
Session No. 11		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Development of knowledge tests		
Overview, issues addressed:	• Development of knowledge tests • Delivering different types of lessons at the university		
Aims and learning outcomes:	• Knowledge and understanding of the types of tests, types of questions, specification table • Critical review and evaluation of their own and other students' teaching		
Practice teaching elements included:	Delivering different types of lessons at the university		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	40%	**30 %**	**30%**
Practice teaching format used:	☐ mock model lesson at the University by lecturer ■ by student ☐ model class in schools ☐ by student ☐ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C)and descriptors (D) to be applied or trained:	**C8 Self-efficacy** D44 Expresses a belief in his/her own ability to understand issues (B) **C10 Autonomous learning skills** D61 Can assess the quality of his/her own work (I) **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I)		
Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-11:30: room 308 – small-group classroom or online, day 1 10:00-13:30: room 308 – small-group classroom or online, day 2		
Materials needed	• Notebooks • National curricula and chemistry textbooks • Other, depending on the teaching method (e.g., laboratory equipment and chemicals, molecular models, posters, …)		

Part II – Session step by step:

Lecture and group work/discussions: 21.12.2020, 10:00 – 11:30

Part 1: 10:00-10:45

Lecturer:

Lecturer introduces various aspects of development of knowledge tests, emphasizing types of tests, types of questions, specification table and scoring.

Part 2: 10:45 – 11:20

Task for students:

Students develop specification table and modify their previously prepared tests according to newly acquired knowledge.

Part 3: 11:20– 11:30

Presenting homework:

Students should analyse one national chemistry competition test for primary or secondary school students.

School practice and group work/discussions: 23.12.2020, 10:00 – 13:30

Part 1: 10:00-12:30

Task for students:

Students deliver lessons at the university according to the previously developed lesson plan.

Part 2: 12:30-13:30

Lecturer:

Lecturer, together with other students, gives feedback regarding the realization of the lesson by the student.

Part III – Report (Debriefing and evaluation):

General remarks from students:	Students gave reflection about the their colleagues' lectures as well as of their own. In this session, all students had to realize a lesson at university applying ICT. Some students were instructed to use PhET simulations in their lessons. These lessons were very interesting because they involved an approach different from the traditional one that is widely used in our schools. This was a challenge for the students and their comments were positive.
Debriefing of the Chemistry Content including homework	The chemistry topic involved development of knowledge tests as one type of assessment. Criteria for preparation and evaluation of tests were discussed.
Debriefing of the Democracy (EDC/HRE) content	/

Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	**C8 Self-efficacy** D44 Expresses a belief in his/her own ability to understand issues (B) **C10 Autonomous learning skills** D61 Can assess the quality of his/her own work (I) D44 and D61 were addressed when students were given assignments to develop a specification table and modified their previously prepared tests. **C12. Skills of listening and observing** D70 Listens carefully to differing opinions (B) D73. Can listen effectively in order to decipher another person's meanings and intentions (I) **C18. Knowledge and critical understanding of the self** D109. Can reflect critically on himself/herself from a number of different perspectives (I) These descriptors were addressed when students delivered lessons and further discussed with the mentors, lecturer and other students.
General remarks by the lecturer:	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. This was the last session in which students delivered a lesson and huge progress can be noticed in both their knowledge and their teaching skills. They are now one step closer to becoming teachers.

Session 12: Knowledge and implementation of Bloom's taxonomy

Chemistry Content: Knowledge and implementation of Bloom's taxonomy

Democracy Content: /

Competences for Democratic Culture: No. 10, 11, 16

Date: 28.12.2020	**Time: 10:00–13:30**	**Room: 308 or online**
Session No. 12		**Lecturer(s):** Marina Stojanovska

Part I – General information

Title of Session:	Bloom's taxonomy		
Overview, issues addressed:	• Development of knowledge tests according to Bloom's taxonomy • Introducing game-based learning in chemistry teaching		
Aims and learning outcomes:	• Knowledge and understanding of the principles of development of knowledge tests according to Bloom's taxonomy • Understanding the role and positive outcome of using educational games		
Practice teaching elements included:	/		
Percentage of time allocation:	**Lecture**	**Active learning by University Students**	**Teaching practice in university or mock teaching**
	40%	**60 %**	**/**
Practice teaching format used:	■ mock model lesson at the University by lecturer ☐ by student ☐ model class in schools ☐ by student ☐ classroom teacher ☐ lecturer ☐ other format (specify):		
RFCDC: Competences (C)and descriptors (D) to be applied or trained:	**C10 Autonomous learning skills** D61 Can assess the quality of his/her own work (I) **C11 Analytical and critical thinking skills** D64 Can identify similarities and differences between new information and what is already known D68 Can identify any discrepancies or inconsistencies or divergences in materials being analysed (A) **C16 Co-operation skills** D94 Builds positive relationships with other people in a group (B) D98 Generates enthusiasm among group members for accomplishing shared goals (A)		
Room preparation, infrastructure (board, beamer, flipchart etc.):	• LCD Projector • Computer • Whiteboard • Whiteboard markers **Room settings:** 10:00-13:30: room 308 – small-group classroom or online, day 1		
Materials needed	• Notebooks • National curricula and chemistry textbooks		

Part II – Session step by step:

Lecture and group work/discussions: 28.12.2020, 10:00 – 13:30

Part 1: 10:00-10:45

Lecturer:

Lecturer introduces Bloom's taxonomy and discussion about assessment based on Bloom's taxonomy.

Part 2: 10:45 – 11:30

Task for students:

Students present the results of the analysis of their and other people's tests, applying the gained knowledge, and improve developed knowledge test in accordance with the Bloom's taxonomy.

Part 3: 11:30– 12:15

Task for students:

Students should analyse one national chemistry competition test for primary or secondary school students.

Part 4: 12:15– 12:30

Lecturer:

Lecturer introduces students to the game-based learning approach as part of the formative assessment and discusses the benefits of this method. The lecturer introduces the students to the escape room game and explains the rules.

Part 5: 12:30-13:15

Task for students:

Students in groups play a game that requires logical and creative thinking to solve puzzles and crack codes.

Part 6: 13:15 – 13:30

Debriefing and evaluation of the session:

We will have a possibility for students to give remarks and comments about the issues discussed in the lesson. The winner group receives an award.

Part III – Report (Debriefing and evaluation):

General remarks from students:	Students expressed satisfaction with the implementation of this session, as well as the activities throughout the semester. What they emphasized was the interactive group work, preparation and critical thinking for the future profession, the way of presentation and analysis of activities, self-reflection, the possibility of attending and teaching at school, etc.
Debriefing of the Chemistry Content including homework	The chemistry topic was implementation of Bloom's taxonomy in assessment. Students applied their previous knowledge about different assessment methods, mostly by designing tests. Also, by using Bloom's taxonomy, students imagined activities that could be used in chemistry teaching.
Debriefing of the Democracy (EDC/HRE) content	/

Debriefing of the RFCDC: Competences (C)and descriptors (D) applied or trained:	**C10 Autonomous learning skills** D61 Can assess the quality of his/her own work (I) **C11 Analytical and critical thinking skills** D64 Can identify similarities and differences between new information and what is already known (B) D68 Can identify any discrepancies or inconsistencies or divergences in materials being analysed (A) Through the activities of the last session related to the assessment of the students, the students are expected to apply all the knowledge previously acquired in this course. This means that they should be able to critically evaluate their work and carefully analyse the information and materials they will encounter in their future work. D61, D64 and D68 help to more easily monitor whether student behaviours are geared towards the goals we want to achieve with the given activities in this session. **C16 Co-operation skills** D94 Builds positive relationships with other people in a group (B) D98 Generates enthusiasm among group members for accomplishing shared goals (A) These descriptors were applied during the realization of the escape room game. The group activities, which are based on play and competition, strengthen the students' communication skills and encourage the cooperation between the students, which is aimed at achieving a common goal, in this case winning.
General remarks by the lecturer:	Due to the COVID-19 pandemic, this session was delivered online using Microsoft Teams. Escape room activity was implemented using breakout rooms option in Microsoft Teams. This was the first time I used breakout rooms to make an escape room, but it was a lot of fun for me and the students. I hope they will apply this experience when they become teachers.

Survey for pre-service teachers

As part of this pilot study, an anonymous survey was conducted among students before and after the implementation of the module. Some of the students' answers from the post-survey are analysed below, and the full survey template is given in Appendix 2.

Which aspects of the course did you find particularly useful for your future teaching practice? (tick any that applies)

Statements	Chosen by pre-service teachers
Learning about key competences and descriptors in accordance with the Reference Framework of Competences for Democratic Culture.	4
The possibility for me to develop my practical skills as a teacher through mock-teaching class.	4
The possibility for me to develop my skills as a teacher by practicing teaching in a school.	6
The interactive group-work.	4
Debriefing sessions.	4
Reflection of my own teaching practice.	3
New resources/ manuals introduced related to democracy and human rights education.	4
Other: Feel free to specify your answer.	0

Will you try to use any of the activities that you took part in during this course in your own future training? If yes, please indicate which one. If no, please explain why not.

Student No.	Answer	Explanation
1	No	I hope and believe that the pandemic will end and that the schools will function normally. Honestly, I would not like to use any of this online teaching. Nothing can replace the chalk (marker) and the blackboard, i.e., the teaching with physical presence.
2	Yes	Descriptors, using a website and PhET simulation in teaching, group and individual work, recreational lesson with quizzes, associations, drawings.
3	Yes	I would use the "dilemma" as an activity.
4	Yes	PhET simulations
5	Yes	Escape room
6	Yes	Yes, I would be ready to explain the new teaching unit with the help of a presentation in an interesting and creative way.

Finally, do you think taking part in this course has improved your teaching skills? Please explain your answer (by examples).

Student No.	Answer	Explanation
1	5	Definitely improved and perfected them, but I will say again I do not want to apply anything from the online teaching that I implemented as part of this course. I believe that online teaching does not have the same effect as attendance teaching. If I ever worked as a school teacher, I would apply something. But, on the other hand, I gained enough competencies on how to deliver and how to revise a lesson in emergency circumstances. So, under normal circumstances, everything I did virtually would be much more effective and easier (for example, a quiz for revision or group work).
2	5	Because we are well acquainted with the use of descriptors, the use of a website and PhET simulation as a kind of interesting lessons, democracy and human rights that are important in the educational process, teamwork gives excellent results when working with students, daily preparations, competition games, Bloom's taxonomy tests, problem-based learning.
3	3	After participating in this project, I became even more familiar with democratic values and that human rights are the most sublime value.
4	5	Because at the end of the class you write for yourself how much you were prepared for the class for which you are responsible as a teacher, communication with the students, etc.
5	5	Getting acquainted with the democratic rights, obligations and responsibilities of the individual inside and outside the school, applying it in school activity through simulation I learned how to improve the democratic life. With the help of the activities that I developed and implemented in online practice I improved my skills as a future teacher. I learned how to organize a lesson; daily, thematic, annual planning; how to make a presentation; how to organize time; diction at a moderate pace; creativity; critically transfer knowledge to students; to motivate students; to draw their own conclusions; to bring the subject closer to them in everyday life. This project gave me the opportunity to improve my skills as a future teacher.
6	5	Thanks to the professor, our skills and preparations for future teachers are very good. By having practical work, we gained experience and skills that will serve us to better and easier transfer our knowledge as future teachers.

In addition to open-ended questions, the survey included Likert type items. These items are listed below, as well as the average value of the students' answers.

Item	Average
After attending the course, I am familiar with Council of Europe Reference Framework of Competences for Democratic Culture (RFCDC)	4.2
Have you ever been introduced to resources/manuals related to democracy and human rights education at your university courses taken so far?	4.5
After participating in this course, I feel better prepared to critically reflect on my future professional practice.	4.7
Knowledge about principles of democratic practice and human rights education are important for improving my future role as a teacher.	4.5
Your view on the importance of creating a democratic culture in school, after participating in this course has changed.	4.7
After participating to this course, I feel better prepared to critically reflect on my future professional practice.	4.5
After participating in this course, I feel better equipped with tools and strategies allowing me to use active and participatory methods in my role as a teacher.	4.3
Finally, do you think taking part in this course has improved your teaching skills?	4.7

Conclusions and reflection from the implementation

Twelve sessions were implemented with the students within the module ***Culture of Democracy through the Didactics of Chemistry***. The preparation process, but also the implementation itself, required a lot of effort and hard work. The integration of chemistry and democracy is a really big challenge because the two seem to have no common ground. But, in fact, the situation is completely different. The more I got into understanding the basic ideas of democracy and became familiar with the basic concepts and activities through which they can be conveyed to students, the more I implemented that these principles were already present in my methodology teaching in chemistry. Together with my students and mentor teachers I was able to introduce elements of democracy in several sessions. A brief overview is given below.

- Session 1: The importance of teaching profession (Democracy Content – Responsibility)
- Session 2: Introduction of the subject. Chemistry curricula in primary and secondary schools (Democracy Content – Rule of law and responsibility)
- Session 3: Planning and organization of the teaching process (Democracy Content – /)
- Session 4: Types of teaching in chemistry education (Democracy Content – RFCDC: Key descriptors, Creating posters)
- Session 5: Classification of lessons (Democracy Content – Charing plenary sessions: Discussion and critical thinking)
- Session 6: Introduction to teaching methods (Democracy Content – Charing plenary sessions: Discussion and critical thinking, Task-based learning)
- Session 7: Teaching methods in chemistry (Democracy Content – Teaching controversial issues)
- Session 8: Graphical tools for organization and visualization in chemistry teaching (Democracy Content – Debating, dilemmas)
- Session 9: Sources of scientific knowledge (Democracy Content – Skills and strategies for media literacy)
- Session 10: Assessment in chemistry (Democracy Content – /)
- Session 11: Development of knowledge tests (Democracy Content – /)
- Session 12: Knowledge and implementation of Bloom's taxonomy (Democracy Content – /)

Another challenge I faced in teaching was the Covid-19 pandemic. Conditions for working in a pandemic are very different from normal. School practice was impossible to implement in schools because all teaching was remotely. Accordingly, we have adapted both university teaching and school practice to these conditions and they have been conducted entirely online. At the beginning I was afraid that the probability of failure in remote teaching is higher, because working online is much more difficult and requires many different competencies. But surprisingly, things turned out much better than expected. The help and support of the mentor teachers was high, and their role was irreplaceable. They were a great example to the students of what it means to be a good teacher who can handle any situation and overcome all the challenges he/she faces. In addition to the successful lesson delivery by both the lectures and the students, I noticed an increased degree of creativity and engagement of the students. It is with great pleasure I can state that this generation of students will forever be engraved in my memory.

Appendices

Appendix 1. Action-Verbs in the centre of learning activities (following Bloom's revised Taxonomy)

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analysing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate under-standing of facts/ideas by organizing, comparing, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	Choose Define Find Label List Match Name Recall Relate Select Show Spell Tell Specify: What When Where Which Who Why	Classify Compare Contrast Demonstrate Explain Extend Illustrate Interpret Outline Relate Rephrase Show Summarize Translate	Apply Build Choose Construct Develop Experiment with Identify Interview Make use of Model Organize Plan Select Solve Utilize	Analyse Assume Categorize Classify Compare Conclusion Contrast Discover Dissect Distinguish Divide Examine Function Inference Inspect List Motive Simplify Survey Take part in Test for	Agree Appraise Assess Award Choose Compare Conclude Criteria Criticize Decide Defend Determine Estimate Evaluate Explain Influence Interpret Judge Justify Mark Measure Perceive Prioritize Prove Recommend Select Support Value	Adapt Build Change Choose Combine Compile Compose Construct Create Delete Design Develop Discuss Elaborate Estimate Formulate Imagine Improve Invent Maximize Minimize Modify Plan Predict Propose Solve Suppose Test

Appendix 2. Students' survey template (pre•and post-survey)

Survey for teacher students before starting the course/module

Pre

Country:

University and Faculty …….

Title of the course ……

Name of the lecturer ……

The course was on bachelor level ☐

The course was carried out on master's level ☐

Female ☐

Male ☐

You will attend a semester course that is part of an international democracy project. The regular course content in this course will be combined with knowledge elements about democracy. Also, the concept of so-called competences for a culture of democracy, developed by the Council of Europe, will be presented. As a third element, this course is characterized by the idea that more practical relevance must be included in the training of teachers. We ask you to answer the following questions. It helps us to improve ourselves and to learn more about the impact.

I. General remarks

Please, answer the following questions:

1. I am familiar with Council of Europe Reference Framework of Competences for Democratic Culture (RFCDC)

Nt at all		To some degree		A great deal
1	2	3	4	5

3. Through my teaching education I have practiced teaching through e.g., mock-teaching and improving my teaching skills

Not at all		To some degree		A great deal
1	2	3	4	5

5. Through my teacher education I have carried out practice teaching in schools

Not at all		To some degree		A great deal
1	2	3	4	5

7. I have received feedback from my mentors (if) when I have carried out teaching practice (mock-teaching and school practice) which has helped improving my teaching skills.

Not at all		To some degree		A great deal
1	2	3	4	5

9. Have you ever been introduced to resources/manuals related to democracy and human rights education at your university courses taken so far?

Not at all		To some degree		A great deal
1	2	3	4	5

II.Democracy content and RFCDC

11. Have you ever discussed/been exposed/ reflected upon importance of creating a democratic culture in school in during your university education?

Not at all		To some degree		A great deal
1	2	3	4	5

13. To what extend do you believe knowledge about principles of democratic practice and human rights education are important in your future role as a teacher.

Not at all		To some degree		A great deal
1	2	3	4	5

III.Teaching skills

15. Please rate the following statement:
I feel prepared to critically reflect on my future professional practice.

Not at all		To some degree		A great deal
1	2	3	4	5

17. Please rate the following statement:
I am currently equipped with tools and strategies allowing me to use active and participatory methods in my role as a teacher.

Not at all		To some degree		A great deal
1	2	3	4	5

19. Please, rate the following statement:
Practice teaching (mock teaching classes or teaching practice with pupils in a school) is an important element in education for future teachers.

Not at all		To some degree		A great deal
1	2	3	4	5

Survey for teacher students after finalizing the course/module

Post

Country:

University and Faculty …….

Title of the course ……

Name of the lecturer ……

The course was on bachelor level ☐

The course was carried out on master's level ☐

Female ☐

Male ☐

You have attended a semester course that is part of an international democracy project. The regular course content was combined with knowledge elements about democracy. Also, the concept of so-called competences for a culture of democracy, developed by the Council of Europe, was presented. As a third element, this course is characterized by the idea that more practical relevance must be included in the training of teachers. We ask you to answer the following questions. It helps us to improve ourselves and to learn more about the impact.

I.General remarks

Please, answer the following questions:

1. After attending the course, I am familiar with Council of Europe Reference Framework of Competences for Democratic Culture (RFCDC)

Not at all		To some degree		A great deal
1	2	3	4	5

2. By participating in this course, I have been able to practice teaching practice to a larger extent that previously.

Not at all		To some degree		A great deal
1	2	3	4	5

3. Through my teacher education I have carried out practice teaching in schools

Not at all		To some degree		A great deal
1	2	3	4	5

4. I have received feedback from my mentors (if) when I have carried out teaching practice (mock-teaching and school practice) which has helped improving my teaching skills.

Not at all		To some degree		A great deal
1	2	3	4	5

5. Have you ever been introduced to resources/manuals related to democracy and human rights education at your university courses taken so far?

Not at all		To some degree		A great deal
1	2	3	4	5

6. After participating in this course, I feel better prepared to critically reflect on my future professional practice

Not at all		To some degree		A great deal
1	2	3	4	5

Remarks about the Module

7. Which aspects of the course did you find particularly useful for your future teaching practice? (tick any that applies)

☐ Learning about key competences and descriptors in accordance with the Reference Framework of Competences for Democratic Culture

☐ The possibility for me to develop my practical skills as a teacher through mock-teaching class

☐ The possibility for me to develop my skills as a teacher by practicing teaching in a school

☐ The interactive group work

☐ Debriefing sessions

☐ Reflection of my own teaching practice

☐ New resources/ manuals introduced related to democracy and human rights education

☐ Other:

Feel free to specify your answer.

II. Democracy content and RFCDC

8. Your view on the importance of creating a democratic culture in school, after participating in this course has changed.

Not at all		To some degree		A great deal
1	2	3	4	5

9. Knowledge about principles of democratic practice and human rights education are important for improving my future role as a teacher.

Not at all		To some degree		A great deal
1	2	3	4	5

III. Teaching skills

10. Please rate the following statement:
After participating to this course I feel better prepared to critically reflect on my future professional practice.

Not at all		To some degree		A great deal
1	2	3	4	5

11. Please rate the following statement:
After participating in this course I feel better equipped with tools and strategies allowing me to use active and participatory methods in my role as a teacher.

Not at all		To some degree		A great deal
1	2	3	4	5

12. Have you attended/carried out any practical teaching in schools during this course?
☐ YES ☐ NO

13. Have you attended/carried out any practical teaching through mock-teaching during this course?
☐ YES ☐ NO

14. Please, rate the following statement: Practice teaching (mock teaching classes or teaching practice with pupils in a school) is an important element in education for future teachers.

Not at all		To some degree		A great deal
1	2	3	4	5

15. Will you try to use any of the activities that you took part in during this course in your own future training?

☐ YES ☐ NO

If yes, please indicate which one ……..

If no, please explain why not……

16. Finally, do you think taking part in this course has improved your teaching skills?

Not at all		To some degree		A great deal
1	2	3	4	5

Please explain your answer (by examples): ……..